

ARMY EPHEMERIS, 1993-1997

HEADQUARTERS, DEPARTMENT OF THE ARMY

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Field Manual
Number 6-300

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 23 July 1992

Effective 1 January 1993

ARMY EPHEMERIS 1993-1997

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Note. Table numbers are referenced to current FM 6-2. Several tables were omitted due to the new Artillery Astronomic Observation method, which replaces the hour-angle method.

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*This publication supersedes FM 6-300, 15 May 1987.

PREFACE

This manual is a compilation of tables and charts which are used in field computations of astronomical observations by the field artillery. These tables and charts are compiled and provided by the Astronomical Applications Department, US Naval Observatory H. M. Nautical Almanac Office, Royal Greenwich Observatory; and National Oceanic Atmospheric Administration.

This manual reflects the update of data to encompass the years 1993 through 1997. It is designed to be used in conjunction with FM 6-2, *Field Artillery Survey*.

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CHAPTER 1

INTRODUCTION

1-1. PURPOSE AND SCOPE

a. This manual is a compilation of tables and charts for use in computing astronomical azimuths for the field artillery. These tables and charts are used for computing azimuth of the Sun or selected stars by either the altitude or Artillery Astronomic Observation method. Special tables (Tables 12 through 12e), which are tabular methods of computing Polaris, are included for a rapid computation of a Polaris azimuth. Tables and charts are also included to correct astronomic azimuth to grid azimuth and to extend azimuth by simultaneous observation.

b. Data contained in Tables 2a, 2b, 2c, 2d, 2e, 10a(1), 10a(2), 10a(3), 10a(4), 10a(5), 10b(1), 10b(2), 10b(3), 10b(4), 10b(5), 11a, 11b, 11c, 11d, 11e, 12a, 12b, 12c, 12d, and 12e are current only for the years in which the manual is effective.

1-2. DESCRIPTION OF TABLES AND CHARTS

This manual is intended to be used as a companion publication to FM 6-2, *Field Artillery Survey*. Details on the computation of astronomical azimuth and the use of these tables and charts are contained in FM 6-2.

CHAPTER 2

ASTRONOMICAL TABLES AND CHARTS

Table 1a. Astronomic refraction corrected for temperature (degrees)

TO BE SUBTRACTED FROM OBSERVED ALTITUDE OF SUN OR STAR

(Use values of observed altitude and temperature nearest the values tabulated as arguments.)

Observed Altitude	Temperature °F																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "
00 00	40-43	39-45	38-53	38-02	37-15	36-27	35-44	35-01	34-20	33-40	33-01	32-26	31-51	31-36	30-43	30-14	29-46
20	35-57	35-06	34-20	33-35	32-53	32-11	31-33	30-55	30-18	29-44	29-09	28-38	28-07	27-37	27-07	26-42	26-17
40	32-00	31-15	30-34	29-54	29-16	28-39	28-05	27-31	26-59	26-28	25-57	25-30	25-02	24-35	24-09	23-46	23-23
01 00	28-42	28-01	27-25	26-49	26-15	25-42	25-12	24-41	24-12	23-44	23-17	22-52	22-27	22-03	21-40	21-19	20-59
20	25-55	25-19	24-46	24-13	23-43	23-13	22-45	22-18	21-51	21-26	21-02	20-39	20-17	19-55	19-44	19-15	18-57
40	23-34	23-00	22-31	22-01	21-33	21-06	20-41	20-16	19-52	19-29	19-07	18-46	18-26	18-06	17-47	17-30	17-13
02 00	21-32	21-02	20-35	20-07	19-42	19-17	18-54	18-31	18-10	17-49	17-28	17-10	16-51	16-33	16-15	16-00	15-45
20	19-48	19-20	18-54	18-29	18-06	17-43	17-22	17-01	16-41	16-22	16-03	15-46	15-29	15-12	14-56	14-42	14-28
40	18-17	17-51	17-28	17-05	16-43	16-22	16-03	15-43	15-25	15-07	14-50	14-34	14-18	14-02	13-48	13-35	13-22
03 00	16-57	16-33	16-12	15-50	15-30	15-11	14-53	14-35	14-18	14-01	13-45	13-30	13-16	13-01	12-48	12-36	12-24
20	15-47	15-25	15-05	14-45	14-27	14-08	13-51	13-35	13-19	13-04	12-48	12-35	12-21	12-08	11-55	11-44	11-32
40	14-45	14-25	14-06	13-47	13-30	13-13	12-57	12-42	12-27	12-12	11-58	11-46	11-33	11-20	11-08	10-58	10-47
04 00	13-50	13-31	13-13	12-56	12-40	12-24	12-09	11-54	11-40	11-27	11-14	11-02	10-50	10-38	10-27	10-17	10-07
20	13-01	12-43	12-26	12-10	11-55	11-40	11-26	11-12	10-59	10-46	10-34	10-23	10-11	10-00	09-50	09-40	09-31
40	12-17	12-00	11-44	11-29	11-14	11-00	10-47	10-34	10-22	10-10	09-58	09-47	09-37	09-26	09-16	09-08	08-59
05 00	11-38	11-21	11-07	10-52	10-38	10-25	10-13	10-00	09-48	09-37	09-26	09-16	09-06	08-56	08-47	08-38	08-30
20	11-02	10-46	10-32	10-18	10-05	09-53	09-41	09-29	09-18	09-07	08-57	08-47	08-38	08-28	08-19	08-12	08-04
40	10-29	10-14	10-01	09-48	09-35	09-23	09-12	09-01	08-50	08-40	08-30	08-21	08-12	08-03	07-55	07-47	07-40
06 00	09-59	09-45	09-32	09-20	09-08	08-56	08-46	08-35	08-25	08-16	08-06	07-57	07-49	07-40	07-32	07-25	07-18
20	09-32	09-18	09-06	08-54	08-43	08-32	08-22	08-12	08-02	07-53	07-44	07-35	07-27	07-19	07-11	07-05	06-58
40	09-07	08-54	08-42	08-31	08-20	08-09	08-00	07-50	07-41	07-32	07-23	07-16	07-08	07-00	06-53	06-46	06-40
07 00	08-43	08-31	08-20	08-09	07-59	07-49	07-39	07-30	07-21	07-13	07-05	06-57	06-50	06-42	06-35	06-29	06-23
20	08-22	08-10	08-00	07-49	07-39	07-30	07-21	07-12	07-03	06-55	06-47	06-40	06-33	06-26	06-19	06-13	06-07
40	08-02	07-51	07-41	07-31	07-21	07-12	07-03	06-55	06-47	06-39	06-31	06-24	06-17	06-10	06-04	05-58	05-53
08 00	07-44	07-33	07-23	07-13	07-04	06-55	06-47	06-39	06-31	06-24	06-16	06-10	06-03	05-56	05-50	05-45	05-39
20	07-27	07-16	07-07	06-57	06-49	06-40	06-32	06-24	06-17	06-09	06-02	05-56	05-49	05-43	05-37	05-32	05-27
40	07-11	07-01	06-52	06-42	06-34	06-26	06-18	06-10	06-03	05-56	05-49	05-43	05-37	05-31	05-25	05-20	05-15
09 00	06-56	06-46	06-37	06-28	06-20	06-12	06-05	05-58	05-51	05-44	05-37	05-31	05-25	05-19	05-14	05-09	05-04
20	06-42	06-32	06-24	06-15	06-08	06-00	05-53	05-46	05-39	05-32	05-26	05-20	05-14	05-08	05-03	04-58	04-54
40	06-29	06-19	06-11	06-03	05-56	05-48	05-41	05-34	05-28	05-21	05-15	05-10	05-04	04-59	04-53	04-49	04-44
10 00	06-16	06-07	06-00	05-52	05-44	05-37	05-30	05-24	05-17	05-11	05-05	05-00	04-54	04-49	04-44	04-40	04-35
20	06-05	05-56	05-48	05-41	05-34	05-27	05-20	05-14	05-08	05-02	04-56	04-51	04-45	04-40	04-35	04-31	04-27
40	05-54	05-45	05-38	05-30	05-24	05-17	05-10	05-04	04-58	04-53	04-47	04-42	04-37	04-32	04-27	04-23	04-19
11 00	05-43	05-35	05-28	05-21	05-14	05-07	05-01	04-55	04-50	04-44	04-39	04-34	04-29	04-24	04-19	04-15	04-11
20	05-34	05-26	05-19	05-12	05-05	04-59	04-53	04-47	04-41	04-36	04-31	04-26	04-21	04-16	04-12	04-08	04-04
40	05-24	05-17	05-10	05-03	04-57	04-50	04-45	04-39	04-33	04-28	04-23	04-18	04-14	04-09	04-05	04-01	03-57
12 00	05-15	05-08	05-01	04-55	04-49	04-42	04-37	04-31	04-26	04-21	04-16	04-11	04-07	04-02	03-58	03-54	03-51
20	05-07	05-00	04-53	04-47	04-41	04-35	04-30	04-24	04-19	04-14	04-09	04-05	04-00	03-56	03-52	03-48	03-44
40	04-59	04-52	04-46	04-39	04-34	04-28	04-21	04-17	04-12	04-07	04-03	03-58	03-54	03-50	03-46	03-42	03-39

Table 1a. Astronomic refraction corrected for temperature (degrees) - continued

Observed Altitude	Temperature °F																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "
13 00	04-51	04-45	04-38	04-32	04-27	04-21	04-16	04-11	04-06	04-01	03-56	03-52	03-48	03-44	03-40	03-36	03-33
20	04-44	04-37	04-31	04-25	04-20	04-14	04-09	04-04	04-00	03-55	03-50	03-46	03-42	03-38	03-34	03-31	03-27
40	04-37	04-31	04-25	04-19	04-14	04-08	04-03	03-58	03-54	03-49	03-45	03-41	03-37	03-33	03-29	03-26	03-23
14 00	04-31	04-24	04-19	04-13	04-08	04-02	03-58	03-53	03-48	03-44	03-40	03-36	03-32	03-28	03-24	03-21	03-19
20	04-24	04-18	04-12	04-07	04-02	03-57	03-52	03-47	03-43	03-39	03-34	03-31	03-27	03-23	03-19	03-16	03-13
40	04-18	04-12	04-07	04-01	03-56	03-51	03-47	03-41	03-38	03-34	03-29	03-26	03-22	03-18	03-15	03-12	03-09
15 00	04-12	04-06	04-01	03-56	03-51	03-46	03-42	03-37	03-33	03-29	03-25	03-21	03-17	03-14	03-10	03-07	03-04
20	04-07	04-01	03-56	03-51	03-46	03-41	03-37	03-32	03-28	03-24	03-20	03-17	03-13	03-10	03-06	03-03	03-00
40	04-01	03-56	03-51	03-46	03-41	03-36	03-32	03-28	03-24	03-20	03-16	03-12	03-09	03-05	03-02	02-59	02-57
16 00	03-56	03-51	03-46	03-41	03-36	03-32	03-27	03-23	03-19	03-15	03-12	03-08	03-05	03-01	02-58	02-55	02-53
20	03-51	03-46	03-41	03-36	03-32	03-27	03-23	03-19	03-15	03-12	03-08	03-04	03-01	02-58	02-55	02-52	02-49
40	03-47	03-41	03-36	03-32	03-27	03-23	03-19	03-15	03-11	03-07	03-04	03-00	02-57	02-54	02-51	02-48	02-46
17 00	03-42	03-37	03-32	03-27	03-23	03-19	03-15	03-11	03-07	03-04	03-00	02-57	02-54	02-51	02-48	02-45	02-42
20	03-38	03-32	03-28	03-23	03-19	03-15	03-11	03-07	03-03	03-00	02-56	02-53	02-50	02-47	02-44	02-42	02-39
40	03-33	03-28	03-24	03-19	03-15	03-11	03-07	03-03	03-00	02-56	02-53	02-50	02-47	02-44	02-41	02-38	02-36
18 00	03-29	03-24	03-20	03-15	03-11	03-07	03-04	03-00	02-56	02-53	02-50	02-47	02-44	02-41	02-38	02-35	02-33
20	03-25	03-20	03-16	03-12	03-08	03-04	03-00	02-56	02-53	02-50	02-46	02-43	02-41	02-38	02-35	02-32	02-30
40	03-21	03-17	03-12	03-08	03-04	03-00	02-57	02-53	02-50	02-46	02-43	02-40	02-37	02-35	02-32	02-30	02-27
19 00	03-18	03-13	03-09	03-05	03-01	02-57	02-53	02-50	02-47	02-43	02-40	02-37	02-35	02-32	02-29	02-27	02-24
20	03-14	03-09	03-05	03-01	02-58	02-54	02-50	02-47	02-44	02-40	02-37	02-35	02-32	02-29	02-26	02-24	02-22
40	03-10	03-06	03-02	02-58	02-54	02-51	02-47	02-44	02-41	02-38	02-34	02-32	02-29	02-26	02-24	02-21	02-19
20 00	03-07	03-03	02-59	02-55	02-51	02-48	02-44	02-41	02-38	02-35	02-32	02-29	02-26	02-24	02-21	02-19	02-17
20	03-04	02-59	02-56	02-52	02-48	02-45	02-41	02-38	02-35	02-32	02-29	02-26	02-24	02-21	02-19	02-17	02-14
40	03-01	02-56	02-53	02-49	02-45	02-42	02-39	02-35	02-32	02-29	02-27	02-24	02-21	02-19	02-16	02-14	02-12
21 00	02-58	02-53	02-50	02-46	02-42	02-39	02-36	02-33	02-30	02-27	02-24	02-21	02-19	02-16	02-14	02-12	02-10
20	02-55	02-50	02-47	02-43	02-40	02-36	02-33	02-30	02-27	02-24	02-22	02-19	02-17	02-14	02-12	02-10	02-08
40	02-52	02-48	02-44	02-40	02-37	02-34	02-31	02-28	02-25	02-22	02-19	02-17	02-14	02-12	02-10	02-07	02-05
22 00	02-49	02-45	02-41	02-38	02-34	02-31	02-28	02-25	02-22	02-20	02-17	02-14	02-12	02-10	02-07	02-05	02-03
20	02-46	02-42	02-39	02-35	02-32	02-29	02-26	02-23	02-20	02-17	02-15	02-12	02-10	02-08	02-05	02-03	02-01
40	02-43	02-40	02-36	02-33	02-30	02-26	02-23	02-21	02-18	02-15	02-13	02-10	02-08	02-06	02-03	02-01	01-59
23 00	02-41	02-37	02-34	02-30	02-27	02-24	02-21	02-18	02-16	02-13	02-10	02-08	02-06	02-04	02-01	01-59	01-58
20	02-38	02-34	02-31	02-28	02-25	02-22	02-19	02-16	02-13	02-11	02-08	02-06	02-04	02-02	01-59	01-58	01-56
40	02-36	02-32	02-29	02-26	02-23	02-20	02-17	02-14	02-11	02-09	02-06	02-04	02-02	02-00	01-58	01-56	01-54
24 00	02-33	02-30	02-26	02-23	02-20	02-17	02-15	02-12	02-09	02-07	02-04	02-02	02-00	01-58	01-56	01-54	01-52
20	02-31	02-28	02-24	02-21	02-18	02-15	02-13	02-10	02-07	02-05	02-03	02-00	01-58	01-56	01-54	01-52	01-50
40	02-29	02-25	02-22	02-19	02-16	02-13	02-11	02-08	02-05	02-03	02-01	01-59	01-56	01-54	01-52	01-50	01-49
25 00	02-26	02-23	02-20	02-17	02-14	02-11	02-09	02-06	02-04	02-01	01-59	01-57	01-55	01-53	01-51	01-49	01-47
20	02-24	02-21	02-18	02-15	02-12	02-09	02-07	02-04	02-02	02-00	01-57	01-55	01-53	01-51	01-49	01-47	01-46
40	02-22	02-19	02-16	02-13	02-10	02-07	02-05	02-02	02-00	01-58	01-55	01-53	01-51	01-49	01-47	01-46	01-44
26 00	02-20	02-17	02-14	02-11	02-08	02-06	02-03	02-01	01-58	01-56	01-54	01-52	01-50	01-48	01-46	01-44	01-42
20	02-18	02-15	02-12	02-09	02-06	02-04	02-01	01-59	01-56	01-54	01-52	01-50	01-48	01-46	01-44	01-43	01-41
40	02-16	02-13	02-10	02-07	02-05	02-02	02-00	01-57	01-55	01-53	01-50	01-48	01-47	01-45	01-43	01-41	01-40
27 00	02-14	02-11	02-08	02-05	02-03	02-00	01-58	01-55	01-53	01-51	01-49	01-47	01-45	01-43	01-41	01-40	01-38
20	02-12	02-09	02-06	02-04	02-01	01-59	01-56	01-54	01-52	01-49	01-47	01-45	01-44	01-42	01-40	01-38	01-37
40	02-10	02-07	02-05	02-02	01-59	01-57	01-55	01-52	01-50	01-48	01-46	01-44	01-42	01-40	01-38	01-37	01-35

Table 1a. Astronomic refraction corrected for temperature (degrees) - continued

Observed Altitude	Temperature °F																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "
28 00	02-09	02-06	02-03	02-00	01-58	01-55	01-53	01-51	01-48	01-46	01-44	01-43	01-41	01-39	01-37	01-36	01-34
20	02-07	02-04	02-01	01-59	01-56	01-54	01-51	01-49	01-47	01-45	01-43	01-41	01-39	01-37	01-36	01-34	01-33
40	02-05	02-02	02-00	01-57	01-54	01-52	01-50	01-48	01-46	01-43	01-41	01-40	01-38	01-36	01-34	01-33	01-31
29 00	02-03	02-01	01-58	01-55	01-53	01-51	01-48	01-46	01-44	01-42	01-40	01-38	01-37	01-35	01-33	01-32	01-30
20	02-02	01-59	01-56	01-54	01-51	01-49	01-47	01-45	01-43	01-41	01-39	01-37	01-35	01-34	01-32	01-30	01-29
40	02-00	01-57	01-55	01-52	01-50	01-48	01-45	01-43	01-41	01-39	01-37	01-36	01-34	01-32	01-31	01-29	01-28
30 00	01-59	01-56	01-53	01-51	01-48	01-46	01-44	01-42	01-40	01-38	01-36	01-34	01-33	01-31	01-30	01-28	01-27
20	01-57	01-54	01-52	01-49	01-47	01-45	01-43	01-41	01-39	01-37	01-35	01-33	01-32	01-30	01-28	01-27	01-25
40	01-56	01-53	01-50	01-48	01-46	01-43	01-41	01-39	01-37	01-36	01-34	01-32	01-30	01-29	01-27	01-26	01-24
31 00	01-54	01-51	01-49	01-46	01-44	01-42	01-40	01-38	01-36	01-34	01-32	01-31	01-29	01-28	01-26	01-25	01-23
20	01-52	01-50	01-47	01-45	01-43	01-41	01-39	01-37	01-35	01-33	01-31	01-30	01-28	01-26	01-25	01-24	01-22
40	01-51	01-48	01-46	01-44	01-42	01-39	01-37	01-35	01-34	01-32	01-30	01-28	01-27	01-25	01-24	01-22	01-21
32 00	01-50	01-47	01-45	01-42	01-40	01-38	01-36	01-34	01-32	01-31	01-29	01-27	01-26	01-24	01-23	01-21	01-20
30	01-48	01-45	01-43	01-40	01-38	01-36	01-34	01-33	01-31	01-29	01-27	01-26	01-24	01-23	01-21	01-20	01-19
33 00	01-45	01-43	01-41	01-39	01-36	01-34	01-33	01-31	01-29	01-27	01-26	01-24	01-22	01-21	01-20	01-18	01-17
30	01-44	01-41	01-39	01-37	01-35	01-33	01-31	01-29	01-27	01-26	01-24	01-22	01-21	01-20	01-18	01-17	01-16
34 00	01-42	01-39	01-37	01-35	01-33	01-31	01-29	01-27	01-26	01-24	01-22	01-21	01-19	01-18	01-17	01-15	01-14
30	01-40	01-37	01-35	01-33	01-31	01-29	01-28	01-26	01-24	01-23	01-21	01-19	01-18	01-17	01-15	01-14	01-13
35 00	01-38	01-36	01-33	01-31	01-30	01-28	01-26	01-24	01-22	01-21	01-19	01-18	01-17	01-15	01-14	01-13	01-12
30	01-36	01-34	01-32	01-30	01-28	01-26	01-24	01-23	01-21	01-19	01-18	01-17	01-15	01-14	01-12	01-11	01-10
36 00	01-34	01-32	01-30	01-28	01-26	01-24	01-23	01-21	01-20	01-18	01-16	01-15	01-14	01-12	01-11	01-10	01-09
30	01-33	01-30	01-28	01-27	01-25	01-23	01-21	01-20	01-18	01-17	01-15	01-14	01-12	01-11	01-10	01-09	01-08
37 00	01-31	01-29	01-27	01-25	01-23	01-21	01-20	01-18	01-17	01-15	01-14	01-12	01-11	01-10	01-09	01-08	01-06
30	01-29	01-27	01-25	01-23	01-22	01-20	01-18	01-17	01-15	01-14	01-12	01-11	01-10	01-09	01-07	01-06	01-05
38 00	01-28	01-26	01-24	01-22	01-20	01-19	01-17	01-15	01-14	01-13	01-11	01-10	01-09	01-07	01-06	01-05	01-04
30	01-26	01-24	01-22	01-21	01-19	01-17	01-16	01-14	01-13	01-11	01-10	01-09	01-07	01-06	01-05	01-04	01-03
39 00	01-25	01-23	01-21	01-19	01-17	01-16	01-14	01-13	01-11	01-10	01-09	01-07	01-06	01-05	01-04	01-03	01-02
30	01-23	01-21	01-19	01-18	01-16	01-14	01-13	01-12	01-10	01-09	01-07	01-06	01-05	01-04	01-03	01-02	01-01
40 00	01-22	01-20	01-18	01-16	01-15	01-13	01-12	01-10	01-09	01-08	01-06	01-05	01-04	01-03	01-02	01-01	01-00
30	01-20	01-18	01-17	01-15	01-13	01-12	01-10	01-09	01-08	01-06	01-05	01-04	01-03	01-02	01-01	01-00	00-59
41 00	01-19	01-17	01-15	01-14	01-12	01-11	01-09	01-09	01-06	01-05	01-04	01-03	01-02	01-01	01-00	00-59	00-58
30	01-18	01-16	01-14	01-12	01-11	01-09	01-08	01-07	01-05	01-04	01-03	01-02	01-01	01-00	00-59	00-58	00-57
42 00	01-16	01-14	01-13	01-11	01-10	01-08	01-07	01-05	01-04	01-03	01-02	01-01	01-00	00-58	00-57	00-57	00-56
30	01-15	01-13	01-11	01-10	01-08	01-07	01-06	01-04	01-03	01-02	01-01	01-00	00-59	00-57	00-56	00-56	00-55
43 00	01-14	01-12	01-10	01-09	01-07	01-06	01-05	01-03	01-02	01-01	01-00	00-59	00-58	00-56	00-55	00-55	00-54
30	01-12	01-11	01-09	01-08	01-06	01-05	01-04	01-02	01-01	01-00	00-59	00-58	00-57	00-56	00-55	00-54	00-53
44 00	01-11	01-09	01-08	01-06	01-05	01-04	01-02	01-01	01-00	00-59	00-58	00-57	00-56	00-55	00-54	00-53	00-52
30	01-10	01-08	01-07	01-05	01-04	01-03	01-01	01-00	00-59	00-58	00-57	00-56	00-55	00-54	00-53	00-52	00-51
45 00	01-09	01-07	01-06	01-04	01-03	01-01	01-00	00-59	00-58	00-57	00-56	00-55	00-54	00-53	00-52	00-51	00-50
30	01-07	01-06	01-04	01-03	01-02	01-00	00-59	00-58	00-57	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49
46 00	01-06	01-05	01-03	01-02	01-01	00-59	00-58	00-57	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48
30	01-05	01-04	01-02	01-01	01-00	00-58	00-57	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-48

Table 1a. Astronomic refraction corrected for temperature (degrees) - continued

Observed Altitude	Temperature °F																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
° ' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "	' "
47 00	01-04	01-03	01-01	01-00	00-59	00-57	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-48	00-47
30	01-03	01-01	01-00	00-59	00-58	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-47	00-47	00-46
48 00	01-02	01-00	00-59	00-58	00-57	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-47	00-47	00-46	00-45
30	01-01	00-59	00-58	00-57	00-56	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-48	00-47	00-46	00-45	00-44
49 00	01-00	00-58	00-57	00-56	00-55	00-53	00-52	00-51	00-50	00-49	00-48	00-48	00-47	00-46	00-45	00-44	00-44
30	00-59	00-57	00-56	00-55	00-54	00-52	00-51	00-50	00-49	00-48	00-48	00-47	00-46	00-45	00-44	00-44	00-43
50 00	00-58	00-56	00-55	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-47	00-46	00-45	00-44	00-43	00-43	00-42
51 00	00-56	00-54	00-53	00-52	00-51	00-50	00-49	00-48	00-47	00-46	00-45	00-44	00-44	00-43	00-42	00-41	00-41
52 00	00-54	00-52	00-51	00-50	00-49	00-48	00-47	00-46	00-45	00-44	00-43	00-43	00-42	00-41	00-40	00-40	00-39
53 00	00-52	00-50	00-49	00-48	00-47	00-46	00-45	00-44	00-44	00-43	00-42	00-41	00-40	00-40	00-39	00-38	00-38
54 00	00-50	00-49	00-48	00-47	00-46	00-45	00-44	00-43	00-42	00-41	00-41	00-40	00-39	00-38	00-38	00-37	00-37
55 00	00-48	00-47	00-46	00-45	00-44	00-43	00-42	00-41	00-40	00-40	00-39	00-38	00-38	00-37	00-36	00-36	00-35
56 00	00-46	00-45	00-44	00-43	00-42	00-41	00-41	00-40	00-39	00-38	00-38	00-37	00-36	00-36	00-35	00-34	00-34
57 00	00-45	00-44	00-43	00-42	00-41	00-40	00-39	00-38	00-38	00-37	00-36	00-36	00-35	00-34	00-34	00-33	00-33
58 00	00-43	00-42	00-41	00-40	00-39	00-38	00-38	00-37	00-36	00-36	00-35	00-34	00-34	00-33	00-32	00-32	00-31
59 00	00-41	00-40	00-39	00-39	00-38	00-37	00-36	00-35	00-35	00-34	00-33	00-33	00-32	00-32	00-31	00-31	00-30
60 00	00-40	00-39	00-38	00-37	00-36	00-35	00-35	00-34	00-33	00-33	00-32	00-32	00-31	00-30	00-30	00-29	00-29

Table 1b. Astronomic refraction corrected for temperature (mils)

TO BE SUBTRACTED FROM OBSERVED ALTITUDE OF SUN OR STAR

(Use values of observed altitude and temperature nearest the values tabulated as arguments.)

Observed Altitude	Temperature °F																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
0	12.65	12.35	12.08	11.82	11.57	11.33	11.10	10.88	10.66	10.46	10.26	10.08	9.90	9.72	9.54	9.40	9.25
10	9.83	9.60	9.39	9.18	8.99	8.80	8.63	8.45	8.29	8.13	7.97	7.83	7.69	7.55	7.42	7.30	7.19
20	8.18	7.99	7.82	7.64	7.49	7.33	7.21	7.04	6.90	6.77	6.64	6.52	6.40	6.28	6.17	6.08	5.98
30	6.94	6.78	6.63	6.49	6.35	6.22	6.09	5.97	5.85	5.74	5.63	5.53	5.43	5.33	5.24	5.16	5.08
40	5.99	5.85	5.72	5.60	5.48	5.36	5.26	5.15	5.05	4.95	4.86	4.77	4.69	4.60	4.52	4.45	4.38
50	5.24	5.11	5.00	4.89	4.79	4.69	4.60	4.50	4.42	4.33	4.25	4.17	4.10	4.02	3.95	3.89	3.83
60	4.64	4.53	4.43	4.33	4.24	4.15	4.07	3.99	3.91	3.84	3.76	3.70	3.63	3.56	3.50	3.45	3.39
70	4.15	4.05	3.96	3.88	3.80	3.72	3.64	3.57	3.50	3.43	3.37	3.31	3.25	3.19	3.13	3.08	3.03
80	3.75	3.66	3.58	3.50	3.43	3.35	3.29	3.22	3.16	3.10	3.04	2.99	2.93	2.88	2.83	2.78	2.74
90	3.41	3.33	3.26	3.19	3.12	3.06	2.99	2.93	2.88	2.82	2.77	2.72	2.67	2.62	2.57	2.53	2.46
100	3.13	3.05	2.99	2.92	2.86	2.80	2.74	2.69	2.64	2.59	2.54	2.49	2.45	2.40	2.36	2.32	2.28
110	2.88	2.81	2.75	2.69	2.64	2.58	2.53	2.48	2.43	2.38	2.34	2.30	2.25	2.21	2.17	2.14	2.11
120	2.67	2.61	2.55	2.49	2.44	2.39	2.34	2.30	2.25	2.21	2.17	2.13	2.09	2.05	2.01	1.98	1.95
130	2.49	2.43	2.37	2.32	2.27	2.22	2.18	2.14	2.10	2.06	2.02	1.98	1.94	1.91	1.88	1.85	1.82
140	2.32	2.27	2.22	2.17	2.13	2.08	2.04	2.00	1.96	1.92	1.88	1.85	1.82	1.79	1.75	1.73	1.70
150	2.18	2.13	2.08	2.04	2.00	1.95	1.91	1.88	1.84	1.80	1.77	1.74	1.71	1.68	1.65	1.62	1.59
160	2.05	2.00	1.96	1.92	1.88	1.84	1.80	1.77	1.73	1.70	1.67	1.64	1.61	1.58	1.55	1.53	1.50
170	1.94	1.89	1.85	1.81	1.77	1.74	1.70	1.67	1.64	1.60	1.57	1.55	1.52	1.49	1.46	1.44	1.42
180	1.84	1.79	1.75	1.72	1.68	1.64	1.61	1.58	1.55	1.52	1.49	1.46	1.44	1.41	1.39	1.36	1.34
190	1.74	1.70	1.67	1.63	1.59	1.56	1.53	1.50	1.47	1.44	1.41	1.39	1.36	1.34	1.32	1.29	1.27
200	1.66	1.62	1.58	1.55	1.52	1.49	1.46	1.43	1.40	1.37	1.35	1.32	1.30	1.27	1.25	1.23	1.21
210	1.58	1.54	1.51	1.48	1.45	1.42	1.39	1.36	1.33	1.31	1.28	1.26	1.24	1.22	1.19	1.18	1.16
220	1.51	1.48	1.44	1.41	1.38	1.35	1.33	1.30	1.27	1.25	1.23	1.20	1.18	1.16	1.14	1.12	1.10
230	1.45	1.41	1.38	1.35	1.32	1.29	1.27	1.25	1.22	1.20	1.17	1.15	1.13	1.11	1.09	1.07	1.06
240	1.39	1.35	1.32	1.29	1.27	1.24	1.22	1.19	1.17	1.15	1.12	1.10	1.08	1.06	1.05	1.03	1.01
250	1.33	1.30	1.27	1.24	1.22	1.19	1.17	1.14	1.12	1.10	1.08	1.06	1.04	1.02	1.00	0.99	0.97
260	1.28	1.25	1.22	1.19	1.17	1.14	1.12	1.10	1.08	1.06	1.04	1.02	1.00	0.98	0.96	0.95	0.93
270	1.23	1.20	1.18	1.15	1.13	1.10	1.08	1.06	1.04	1.02	0.99	0.98	0.96	0.95	0.93	0.91	0.90
280	1.19	1.16	1.13	1.11	1.09	1.06	1.04	1.02	1.00	0.98	0.96	0.94	0.93	0.91	0.90	0.88	0.87
290	1.14	1.12	1.09	1.07	1.05	1.02	1.00	0.98	0.96	0.95	0.93	0.91	0.89	0.88	0.86	0.85	0.84
300	1.10	1.08	1.06	1.03	1.01	0.99	0.97	0.95	0.93	0.91	0.90	0.88	0.86	0.85	0.83	0.82	0.81
310	1.07	1.04	1.02	1.00	0.98	0.96	0.94	0.92	0.90	0.88	0.87	0.85	0.84	0.82	0.81	0.79	0.78
320	1.03	1.01	0.99	0.96	0.94	0.92	0.91	0.89	0.87	0.85	0.84	0.82	0.81	0.79	0.78	0.77	0.75
330	1.00	0.98	0.96	0.93	0.92	0.90	0.88	0.86	0.84	0.83	0.81	0.80	0.78	0.77	0.75	0.74	0.73
340	0.97	0.95	0.93	0.91	0.89	0.87	0.85	0.83	0.82	0.80	0.79	0.77	0.76	0.74	0.73	0.72	0.71
350	0.94	0.92	0.90	0.88	0.86	0.84	0.82	0.81	0.79	0.78	0.76	0.75	0.74	0.72	0.71	0.70	0.69
360	0.91	0.89	0.87	0.85	0.83	0.82	0.80	0.78	0.77	0.75	0.74	0.73	0.71	0.70	0.69	0.68	0.67
370	0.89	0.86	0.85	0.83	0.81	0.79	0.78	0.76	0.75	0.73	0.72	0.71	0.69	0.68	0.67	0.66	0.65
380	0.86	0.84	0.82	0.80	0.79	0.77	0.76	0.74	0.73	0.71	0.70	0.69	0.67	0.66	0.65	0.64	0.63
390	0.84	0.82	0.80	0.78	0.77	0.75	0.73	0.72	0.71	0.69	0.68	0.67	0.65	0.64	0.63	0.62	0.61
400	0.81	0.79	0.78	0.76	0.74	0.73	0.71	0.70	0.69	0.67	0.66	0.65	0.64	0.62	0.61	0.60	0.59

Table 1b. Astronomic refraction corrected for temperature (mils) - continued

Observed Altitude	Temperature °F																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
410	0.79	0.77	0.76	0.74	0.72	0.71	0.70	0.68	0.67	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58
420	0.77	0.75	0.74	0.72	0.71	0.69	0.68	0.66	0.65	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56
430	0.75	0.73	0.72	0.70	0.69	0.67	0.66	0.65	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55
440	0.73	0.71	0.70	0.68	0.67	0.66	0.64	0.63	0.62	0.61	0.59	0.58	0.57	0.56	0.55	0.54	0.54
450	0.71	0.70	0.68	0.67	0.65	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52
460	0.70	0.68	0.66	0.65	0.64	0.62	0.61	0.60	0.59	0.58	0.56	0.55	0.54	0.53	0.53	0.52	0.51
470	0.68	0.66	0.65	0.64	0.62	0.61	0.60	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.50
480	0.66	0.65	0.63	0.62	0.61	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48
490	0.65	0.63	0.62	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.52	0.52	0.51	0.50	0.49	0.48	0.47
500	0.63	0.62	0.60	0.59	0.58	0.57	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.49	0.48	0.47	0.46
510	0.62	0.62	0.59	0.58	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.47	0.46	0.45
520	0.60	0.59	0.58	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.46	0.45	0.44
530	0.59	0.58	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.45	0.44	0.43
540	0.58	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.43	0.42
550	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.42	0.41
560	0.55	0.54	0.53	0.52	0.50	0.49	0.48	0.47	0.47	0.46	0.45	0.44	0.43	0.42	0.42	0.41	0.40
570	0.54	0.53	0.52	0.50	0.49	0.48	0.47	0.46	0.46	0.45	0.44	0.43	0.42	0.41	0.41	0.40	0.39
580	0.53	0.52	0.50	0.49	0.48	0.47	0.46	0.45	0.45	0.44	0.43	0.42	0.41	0.41	0.40	0.39	0.39
590	0.52	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.42	0.41	0.40	0.40	0.39	0.38	0.38
600	0.51	0.49	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.42	0.41	0.40	0.40	0.39	0.38	0.38	0.37
610	0.50	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.42	0.41	0.40	0.40	0.39	0.38	0.37	0.37	0.36
620	0.49	0.47	0.46	0.45	0.44	0.43	0.43	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.37	0.36	0.35
630	0.48	0.46	0.45	0.44	0.44	0.43	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.37	0.36	0.35	0.35
640	0.47	0.45	0.44	0.43	0.43	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.36	0.36	0.35	0.35	0.34
650	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33
660	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33	0.33
670	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33	0.33	0.32
680	0.43	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33	0.32	0.32	0.31
690	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.34	0.33	0.32	0.32	0.31	0.31
700	0.41	0.40	0.39	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.31	0.30
710	0.40	0.40	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.31	0.30	0.30
720	0.40	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29
730	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.31	0.31	0.30	0.30	0.29	0.29	0.28
740	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28
750	0.37	0.36	0.36	0.35	0.34	0.33	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27
760	0.37	0.36	0.35	0.34	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27
770	0.36	0.35	0.34	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.26
780	0.35	0.34	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.26	0.26
790	0.35	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.26	0.26	0.25
800	0.34	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.26	0.26	0.25	0.25
810	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.25	0.25	0.24	0.24
820	0.33	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.24
830	0.32	0.31	0.31	0.30	0.29	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.23	0.23
840	0.31	0.31	0.30	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.23
850	0.31	0.30	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.24	0.23	0.23	0.22
860	0.30	0.29	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.24	0.23	0.23	0.22	0.22
870	0.30	0.29	0.28	0.28	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.24	0.23	0.23	0.22	0.22	0.22
880	0.29	0.28	0.28	0.27	0.26	0.25	0.25	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21
890	0.28	0.28	0.27	0.27	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.21
900	0.28	0.27	0.27	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.21	0.20

Table 1b. Astronomic refraction corrected for temperature (mils) - continued

Observed Altitude	Temperature °F																
	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120	+130
♠	♠	♠	♠	♠	♠	♠	♠	♠	♠	♠	♠	♠	♠	♠	♠	♠	♠
910	0.27	0.27	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.21	0.20	0.20
920	0.27	0.26	0.26	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.21	0.20	0.20	0.20
930	0.26	0.26	0.25	0.24	0.24	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19
940	0.26	0.25	0.25	0.24	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19
950	0.25	0.25	0.24	0.23	0.23	0.22	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18
960	0.25	0.24	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18	0.18
970	0.24	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18
980	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17
990	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17
1000	0.23	0.22	0.22	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.17
1010	0.22	0.22	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.16	0.16
1020	0.22	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16
1030	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.16
1040	0.21	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15
1050	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15
1060	0.20	0.19	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15
1070	0.19	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14
1080	0.19	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14
1090	0.19	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14
1100	0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13
1110	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13
1120	0.17	0.17	0.17	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13
1130	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.12
1140	0.16	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12
1150	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12
1160	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.11
1170	0.15	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.11	0.11	0.11
1180	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11
1190	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11
1200	0.14	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.10	0.10

Table 2a. Sun, 1993, for zero hours universal time (GMT)

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS				DAILY CHANGE (SEC)			
	°	' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)	MIN	SEC	HR	MIN	SEC
JAN 0 TH	-23	05 40		-410.57		-02	57.0	6	38	41.3
JAN 1 FR	-23	01 03	+ 278	-409.20	+1.37	-03	25.6	6	42	37.8
2 SA	-22	55 58	+ 305	-407.69	+1.51	-03	53.8	6	46	34.4
3 SU	-22	50 25	+ 332	-406.05	+1.64	-04	21.6	6	50	30.9
4 MO	-22	44 26	+ 360	-404.27	+1.78	-04	49.1	6	54	27.5
5 TU	-22	37 59	+ 387	-402.37	+1.91	-05	16.1	6	58	24.0
6 WE	-22	31 06	+ 413	-400.32	+2.04	-05	42.7	7	02	20.6
7 TH	-22	23 45	+ 440	-398.15	+2.17	-06	08.8	7	06	17.2
8 FR	-22	15 59	+ 467	-395.85	+2.31	-06	34.5	7	10	13.7
9 SA	-22	07 46	+ 493	-393.41	+2.43	-06	59.6	7	14	10.3
10 SU	-21	59 08	+ 519	-390.85	+2.56	-07	24.2	7	18	06.9
11 MO	-21	50 03	+ 544	-388.16	+2.69	-07	48.2	7	22	03.4
12 TU	-21	40 33	+ 570	-385.35	+2.81	-08	11.6	7	26	00.0
13 WE	-21	30 38	+ 595	-382.41	+2.94	-08	34.5	7	29	56.5
14 TH	-21	20 17	+ 620	-379.35	+3.06	-08	56.8	7	33	53.1
15 FR	-21	09 32	+ 645	-376.16	+3.19	-09	18.4	7	37	49.6
16 SA	-20	58 23	+ 669	-372.85	+3.30	-09	39.4	7	41	46.2
17 SU	-20	46 49	+ 694	-369.43	+3.43	-09	59.7	7	45	42.7
18 MO	-20	34 52	+ 717	-365.89	+3.54	-10	19.3	7	49	39.3
19 TU	-20	22 31	+ 741	-362.23	+3.66	-10	38.3	7	53	35.9
20 WE	-20	09 47	+ 764	-358.46	+3.77	-10	56.5	7	57	32.4
21 TH	-19	56 41	+ 787	-354.57	+3.89	-11	14.0	8	01	29.0
22 FR	-19	43 12	+ 809	-350.58	+4.00	-11	30.7	8	05	25.5
23 SA	-19	29 21	+ 831	-346.47	+4.10	-11	46.6	8	09	22.1
24 SU	-19	15 08	+ 853	-342.26	+4.21	-12	01.8	8	13	18.7
25 MO	-19	00 34	+ 874	-337.95	+4.32	-12	16.2	8	17	15.2
26 TU	-18	45 40	+ 895	-333.53	+4.42	-12	29.8	8	21	11.8
27 WE	-18	30 25	+ 915	-329.01	+4.52	-12	42.6	8	25	08.3
28 TH	-18	14 50	+ 935	-324.39	+4.62	-12	54.5	8	29	04.9
29 FR	-17	58 55	+ 955	-319.68	+4.72	-13	05.6	8	33	01.4
30 SA	-17	42 41	+ 974	-314.87	+4.81	-13	15.9	8	36	58.0
31 SU	-17	26 08	+ 993	-309.96	+4.90	-13	25.4	8	40	54.5
			+1011		+4.99		- 8.6			

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN SEC		DAILY CHANGE (SEC)	HR MIN SEC		
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
FEB 1 MO	-17	09 16		-304.97		-13 34.0		8 44 51.1		
2 TU	-16	52 07	+1029	-299.89	+5.08	-13 41.8	- 7.8	8 48 47.6		
3 WE	-16	34 40	+1047	-294.72	+5.17	-13 48.8	- 7.0	8 52 44.2		
4 TH	-16	16 56	+1064	-289.46	+5.25	-13 54.9	- 6.1	8 56 40.8		
5 FR	-15	58 55	+1081	-284.12	+5.34	-14 00.2	- 5.3	9 00 37.3		
6 SA	-15	40 37	+1098	-278.70	+5.42	-14 04.7	- 4.5	9 04 33.9		
7 SU	-15	22 04	+1114	-273.20	+5.50	-14 08.4	- 3.7	9 08 30.4		
8 MO	-15	03 14	+1129	-267.63	+5.58	-14 11.2	- 2.9	9 12 27.0		
9 TU	-14	44 10	+1145	-261.97	+5.65	-14 13.3	- 2.1	9 16 23.5		
10 WE	-14	24 50	+1159	-256.25	+5.72	-14 14.6	- 1.3	9 20 20.1		
11 TH	-14	05 16	+1174	-250.45	+5.80	-14 15.2	- 0.5	9 24 16.6		
12 FR	-13	45 28	+1188	-244.58	+5.87	-14 15.0	+ 0.2	9 28 13.2		
13 SA	-13	25 27	+1202	-238.65	+5.94	-14 14.0	+ 0.9	9 32 09.7		
14 SU	-13	05 11	+1215	-232.65	+6.00	-14 12.4	+ 1.7	9 36 06.3		
15 MO	-12	44 43	+1228	-226.59	+6.06	-14 10.0	+ 2.4	9 40 02.9		
16 TU	-12	24 03	+1240	-220.46	+6.12	-14 06.9	+ 3.1	9 43 59.4		
17 WE	-12	03 11	+1252	-214.27	+6.18	-14 03.1	+ 3.8	9 47 56.0		
18 TH	-11	42 07	+1264	-208.03	+6.24	-13 58.6	+ 4.5	9 51 52.5		
19 FR	-11	20 52	+1275	-201.74	+6.30	-13 53.4	+ 5.2	9 55 49.1		
20 SA	-10	59 26	+1286	-195.39	+6.35	-13 47.6	+ 5.8	9 59 45.6		
21 SU	-10	37 50	+1296	-188.99	+6.40	-13 41.1	+ 6.5	10 03 42.2		
22 MO	-10	16 04	+1306	-182.54	+6.45	-13 34.0	+ 7.1	10 07 38.7		
23 TU	- 9	54 09	+1315	-176.04	+6.49	-13 26.2	+ 7.8	10 11 35.3		
24 WE	- 9	32 04	+1324	-169.50	+6.54	-13 17.9	+ 8.4	10 15 31.8		
25 TH	- 9	09 51	+1333	-162.92	+6.58	-13 08.9	+ 9.0	10 19 28.4		
26 FR	- 8	47 30	+1341	-156.30	+6.62	-12 59.3	+ 9.6	10 23 24.9		
27 SA	- 8	25 02	+1349	-149.64	+6.66	-12 49.2	+10.1	10 27 21.5		
28 SU	- 8	02 25	+1356	-142.94	+6.70	-12 38.5	+10.7	10 31 18.0		
			+1363		+6.73		+11.3			

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN SEC		DAILY CHANGE (SEC)	HR MIN SEC		
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
MAR 1 MO	- 7 39 42		-136.21		-12 27.2			10 35 14.6		
2 TU	- 7 16 53	+1370	-129.45	+6.77	-12 15.4	+11.8		10 39 11.2		
3 WE	- 6 53 57	+1376	-122.65	+6.80	-12 03.1	+12.3		10 43 07.7		
4 TH	- 6 30 55	+1381	-115.83	+6.82	-11 50.3	+12.8		10 47 04.3		
5 FR	- 6 07 49	+1387	-108.98	+6.85	-11 37.1	+13.3		10 51 00.8		
6 SA	- 5 44 37	+1392	-102.11	+6.87	-11 23.4	+13.7		10 54 57.4		
7 SU	- 5 21 21	+1396	- 95.21	+6.89	-11 09.2	+14.1		10 58 53.9		
8 MO	- 4 58 00	+1401	- 88.30	+6.92	-10 54.7	+14.5		11 02 50.5		
9 TU	- 4 34 35	+1405	- 81.36	+6.94	-10 39.7	+14.9		11 06 47.0		
10 WE	- 4 11 07	+1408	- 74.41	+6.95	-10 24.4	+15.3		11 10 43.6		
11 TH	- 3 47 36	+1411	- 67.44	+6.97	-10 08.8	+15.6		11 14 40.1		
12 FR	- 3 24 02	+1414	- 60.45	+6.98	-09 52.9	+15.9		11 18 36.7		
13 SA	- 3 00 25	+1417	- 53.46	+7.00	-09 36.7	+16.2		11 22 33.2		
14 SU	- 2 36 46	+1419	- 46.45	+7.01	-09 20.2	+16.5		11 26 29.8		
15 MO	- 2 13 06	+1421	- 39.44	+7.02	-09 03.5	+16.7		11 30 26.4		
16 TU	- 1 49 24	+1422	- 32.41	+7.02	-08 46.6	+16.9		11 34 22.9		
17 WE	- 1 25 41	+1423	- 25.39	+7.03	-08 29.5	+17.1		11 38 19.5		
18 TH	- 1 01 57	+1424	- 18.36	+7.03	-08 12.1	+17.3		11 42 16.0		
19 FR	- 0 38 14	+1424	- 11.33	+7.03	-07 54.7	+17.5		11 46 12.6		
20 SA	- 0 14 30	+1424	- 4.30	+7.03	-07 37.0	+17.6		11 50 09.1		
21 SU	+ 0 09 13	+1423	+ 2.73	+7.03	-07 19.3	+17.7		11 54 05.7		
22 MO	+ 0 32 55	+1422	+ 9.75	+7.02	-07 01.5	+17.9		11 58 02.2		
23 TU	+ 0 56 36	+1421	+ 16.77	+7.02	-06 43.5	+17.9		12 01 58.8		
24 WE	+ 1 20 15	+1419	+ 23.78	+7.01	-06 25.5	+18.0		12 05 55.3		
25 TH	+ 1 43 52	+1417	+ 30.77	+7.00	-06 07.4	+18.1		12 09 51.9		
26 FR	+ 2 07 26	+1415	+ 37.76	+6.99	-05 49.3	+18.1		12 13 48.4		
27 SA	+ 2 30 58	+1412	+ 44.73	+6.97	-05 31.2	+18.1		12 17 45.0		
28 SU	+ 2 54 27	+1409	+ 51.69	+6.96	-05 13.1	+18.1		12 21 41.5		
29 MO	+ 3 17 52	+1405	+ 58.63	+6.94	-04 54.9	+18.1		12 25 38.1		
30 TU	+ 3 41 13	+1401	+ 65.55	+6.92	-04 36.8	+18.1		12 29 34.6		
31 WE	+ 4 04 30	+1397	+ 72.45	+6.90	-04 18.8	+18.0		12 33 31.2		
		+1392		+6.87		+18.0				

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
APR 1 TH	+ 4 27 43		+ 79.32		-04 00.8			12 37 27.7		
2 FR	+ 4 50 50	+1387	+ 86.17	+6.85	-03 42.9	+17.9		12 41 24.3		
3 SA	+ 5 13 52	+1382	+ 93.00	+6.82	-03 25.1	+17.8		12 45 20.9		
4 SU	+ 5 36 49	+1377	+ 99.80	+6.80	-03 07.5	+17.7		12 49 17.4		
5 MO	+ 5 59 39	+1371	+106.56	+6.77	-02 50.0	+17.5		12 53 14.0		
6 TU	+ 6 22 24	+1364	+113.30	+6.74	-02 32.6	+17.3		12 57 10.5		
7 WE	+ 6 45 01	+1358	+120.01	+6.71	-02 15.5	+17.2		13 01 07.0		
8 TH	+ 7 07 32	+1351	+126.68	+6.67	-01 58.5	+16.9		13 05 03.6		
9 FR	+ 7 29 56	+1344	+126.68	+6.64	-01 41.8	+16.7		13 09 00.2		
10 SA	+ 7 52 12	+1336	+133.31	+6.60	-01 25.4	+16.4		13 12 56.7		
11 SU	+ 8 14 21	+1328	+139.91	+6.56	-01 09.2	+16.2		13 16 53.3		
12 MO	+ 8 36 21	+1320	+146.47	+6.52	-01 09.2	+15.9		13 16 53.3		
13 TU	+ 8 58 12	+1312	+152.99	+6.52	-00 53.4	+15.5		13 20 49.8		
14 WE	+ 9 19 55	+1303	+159.47	+6.48	-00 37.9	+15.2		13 24 46.4		
15 TH	+ 9 41 29	+1294	+165.90	+6.43	-00 22.7	+15.2		13 28 42.9		
16 FR	+10 02 53	+1284	+172.29	+6.39	-00 07.8	+14.8		13 32 39.5		
17 SA	+10 24 07	+1274	+178.63	+6.34	+00 06.7	+14.5		13 36 36.0		
18 SU	+10 45 11	+1264	+184.92	+6.29	+00 20.8	+14.1		13 40 32.6		
19 MO	+11 06 04	+1253	+191.16	+6.24	+00 34.5	+13.7		13 44 29.1		
20 TU	+11 26 46	+1242	+197.35	+6.19	+00 47.8	+13.3		13 48 25.7		
21 WE	+11 47 17	+1231	+203.49	+6.13	+01 00.7	+12.9		13 52 22.2		
22 TH	+12 07 36	+1219	+209.57	+6.08	+01 13.1	+12.5		13 56 18.8		
23 FR	+12 27 44	+1207	+215.59	+6.02	+01 25.1	+12.0		14 00 15.3		
24 SA	+12 47 39	+1195	+221.55	+5.96	+01 36.7	+11.6		14 04 11.9		
25 SU	+13 07 21	+1182	+227.45	+5.90	+01 47.8	+11.1		14 08 08.4		
26 MO	+13 26 50	+1169	+233.29	+5.84	+01 58.5	+10.7		14 12 05.0		
27 TU	+13 46 06	+1156	+239.06	+5.77	+02 08.7	+10.2		14 16 01.6		
28 WE	+14 05 09	+1142	+244.77	+5.71	+02 18.4	+ 9.7		14 19 58.1		
29 TH	+14 23 57	+1128	+250.41	+5.64	+02 27.6	+ 9.2		14 23 54.7		
30 FR	+14 42 31	+1114	+255.99	+5.57	+02 36.3	+ 8.7		14 27 51.2		
		+1099	+261.49	+5.50	+02 44.5	+ 8.2		14 31 47.8		
				+5.43		+ 7.7				

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
MAY 1 SA	+15 00 51		+266.92		+02 52.3			14 35 44.4		
2 SU	+15 18 55	+1084	+272.27	+5.35	+02 59.5	+ 7.2		14 39 40.9		
3 MO	+15 36 44	+1069	+277.55	+5.28	+03 06.1	+ 6.7		14 43 37.4		
4 TU	+15 54 18	+1054	+282.75	+5.20	+03 12.3	+ 6.1		14 47 34.0		
5 WE	+16 11 35	+1038	+287.88	+5.13	+03 17.9	+ 5.6		14 51 30.5		
6 TH	+16 28 37	+1022	+292.92	+5.05	+03 23.0	+ 5.1		14 55 27.1		
7 FR	+16 45 22	+1005	+297.89	+4.96	+03 27.4	+ 4.5		14 59 23.7		
8 SA	+17 01 51	+ 989	+302.77	+4.88	+03 31.4	+ 3.9		15 03 20.2		
9 SU	+17 18 03	+ 972	+307.57	+4.80	+03 34.7	+ 3.3		15 07 16.8		
10 MO	+17 33 57	+ 954	+312.28	+4.71	+03 37.5	+ 2.8		15 11 13.3		
11 TU	+17 49 34	+ 937	+316.91	+4.63	+03 39.6	+ 2.2		15 15 09.9		
12 WE	+18 04 53	+ 919	+321.44	+4.54	+03 41.2	+ 1.6		15 19 06.5		
13 TH	+18 19 53	+ 901	+325.89	+4.45	+03 42.2	+ 1.0		15 23 03.0		
14 FR	+18 34 35	+ 882	+330.25	+4.36	+03 42.6	+ 0.4		15 26 59.6		
15 SA	+18 48 59	+ 863	+334.51	+4.26	+03 42.4	- 0.2		15 30 56.1		
16 SU	+19 03 03	+ 844	+338.68	+4.17	+03 41.7	- 0.8		15 34 52.7		
17 MO	+19 16 48	+ 825	+342.76	+4.07	+03 40.3	- 1.4		15 38 49.2		
18 TU	+19 30 14	+ 805	+346.73	+3.98	+03 38.4	- 1.9		15 42 45.8		
19 WE	+19 43 19	+ 786	+350.61	+3.88	+03 35.9	- 2.5		15 46 42.3		
20 TH	+19 56 05	+ 765	+354.39	+3.78	+03 32.8	- 3.1		15 50 38.9		
21 FR	+20 08 30	+ 745	+358.07	+3.68	+03 29.2	- 3.6		15 54 35.4		
22 SA	+20 20 34	+ 724	+361.65	+3.58	+03 25.1	- 4.1		15 58 32.0		
23 SU	+20 32 18	+ 703	+365.12	+3.47	+03 20.4	- 4.7		16 02 28.6		
24 MO	+20 43 40	+ 682	+368.49	+3.37	+03 15.3	- 5.2		16 06 25.1		
25 TU	+20 54 41	+ 661	+371.76	+3.26	+03 09.6	- 5.7		16 10 21.7		
26 WE	+21 05 20	+ 639	+374.91	+3.16	+03 03.4	- 6.2		16 14 18.2		
27 TH	+21 15 37	+ 617	+377.96	+3.05	+02 56.8	- 6.6		16 18 14.8		
28 FR	+21 25 33	+ 595	+380.90	+2.94	+02 49.7	- 7.1		16 22 11.4		
29 SA	+21 35 06	+ 573	+383.73	+2.83	+02 42.2	- 7.5		16 26 07.9		
30 SU	+21 44 16	+ 551	+386.45	+2.72	+02 34.2	- 7.9		16 30 04.5		
31 MO	+21 53 04	+ 528	+389.06	+2.61	+02 25.9	- 8.4		16 34 01.0		
		+ 505		+2.49		- 8.8				

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS							
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
					MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
JUN 1 TU	+22 01 29		+391.55		+02 17.1			16 37	57.6	
2 WE	+22 09 31	+ 482	+393.93	+2.38	+02 08.0		- 9.1	16 41	54.1	
3 TH	+22 17 10	+ 459	+396.20	+2.27	+01 58.5		- 9.5	16 45	50.7	
4 FR	+22 24 26	+ 436	+398.35	+2.15	+01 48.6		- 9.9	16 49	47.2	
5 SA	+22 31 18	+ 412	+400.38	+2.03	+01 38.4		-10.2	16 53	43.8	
6 SU	+22 37 46	+ 388	+402.30	+1.92	+01 27.9		-10.5	16 57	40.4	
7 MO	+22 43 51	+ 365	+404.10	+1.80	+01 17.0		-10.9	17 01	36.9	
8 TU	+22 49 32	+ 341	+405.79	+1.68	+01 05.8		-11.2	17 05	33.5	
9 WE	+22 54 48	+ 317	+407.35	+1.57	+00 54.4		-11.5	17 09	30.0	
10 TH	+22 59 41	+ 293	+408.79	+1.45	+00 42.6		-11.7	17 13	26.6	
11 FR	+23 04 09	+ 268	+410.12	+1.32	+00 30.7		-12.0	17 17	23.2	
12 SA	+23 08 13	+ 244	+411.32	+1.20	+00 18.5		-12.2	17 21	19.7	
13 SU	+23 11 52	+ 219	+412.41	+1.08	+00 06.1		-12.4	17 25	16.3	
14 MO	+23 15 07	+ 195	+413.37	+0.96	+00 06.5		-12.6	17 29	12.8	
15 TU	+23 17 57	+ 170	+414.21	+0.84	-00 06.5		-12.7	17 29	12.8	
16 WE	+23 20 23	+ 145	+414.93	+0.72	-00 19.3		-12.9	17 33	09.4	
17 TH	+23 22 23	+ 121	+414.93	+0.72	-00 32.1		-12.9	17 37	05.9	
18 FR	+23 23 59	+ 96	+415.52	+0.60	-00 45.1		-13.0	17 41	02.5	
19 SA	+23 23 59	+ 96	+416.00	+0.47	-00 58.2		-13.1	17 44	59.0	
20 SU	+23 25 11	+ 71	+416.35	+0.35	-01 11.3		-13.1	17 48	55.6	
21 MO	+23 25 57	+ 46	+416.58	+0.23	-01 24.5		-13.2	17 52	52.2	
22 TU	+23 26 19	+ 22	+416.68	+0.11	-01 37.7		-13.2	17 56	48.7	
23 WE	+23 26 15	- 3	+416.67	-0.01	-01 50.8		-13.1	18 00	45.3	
24 TH	+23 25 47	- 28	+416.53	-0.14	-02 03.9		-13.1	18 04	41.9	
25 FR	+23 24 55	- 53	+416.27	-0.26	-02 16.9		-13.0	18 08	38.4	
26 SA	+23 23 37	- 77	+415.89	-0.38	-02 29.8		-12.9	18 12	35.0	
27 SU	+23 21 55	- 102	+415.38	-0.50	-02 42.5		-12.8	18 16	31.5	
28 MO	+23 19 48	- 127	+414.76	-0.63	-02 55.1		-12.6	18 20	28.1	
29 TU	+23 17 17	- 151	+414.01	-0.75	-03 07.5		-12.4	18 24	24.6	
30 WE	+23 14 21	- 176	+413.14	-0.87	-03 19.7		-12.2	18 28	21.2	
	+23 11 01	- 200	+412.15	-0.99	-03 31.7		-12.0	18 32	17.7	
		- 225		-1.11			-11.7			

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS		MIN SEC		HR MIN SEC		
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)					
JUL 1 TH	+23 07 16	- 249	+411.04	-1.23	-03 43.4	-11.5	18 36 14.3		
2 FR	+23 03 08	- 273	+409.82	-1.35	-03 54.9	-11.2	18 40 10.9		
3 SA	+22 58 35	- 297	+408.47	-1.47	-04 06.1	-10.9	18 44 07.4		
4 SU	+22 53 38	- 321	+407.00	-1.59	-04 16.9	-10.6	18 48 04.0		
5 MO	+22 48 17	- 345	+405.42	-1.70	-04 27.5	-10.2	18 52 00.5		
6 TU	+22 42 32	- 368	+403.72	-1.82	-04 37.7	- 9.9	18 55 57.1		
7 WE	+22 36 24	- 392	+401.90	-1.94	-04 47.6	- 9.5	18 59 53.7		
8 TH	+22 29 52	- 415	+399.96	-2.05	-04 57.2	- 9.1	19 03 50.2		
9 FR	+22 22 57	- 438	+397.91	-2.16	-05 06.3	- 8.8	19 07 46.8		
10 SA	+22 15 39	- 461	+395.75	-2.28	-05 15.1	- 8.3	19 11 43.3		
11 SU	+22 07 57	- 484	+393.47	-2.39	-05 23.4	- 7.9	19 15 39.9		
12 MO	+21 59 53	- 507	+391.08	-2.50	-05 31.3	- 7.5	19 19 36.4		
13 TU	+21 51 26	- 530	+388.57	-2.62	-05 38.8	- 7.0	19 23 33.0		
14 WE	+21 42 36	- 552	+385.96	-2.73	-05 45.8	- 6.6	19 27 29.5		
15 TH	+21 33 24	- 574	+383.23	-2.83	-05 52.4	- 6.1	19 31 26.1		
16 FR	+21 23 50	- 596	+380.40	-2.94	-05 58.5	- 5.6	19 35 22.6		
17 SA	+21 13 54	- 617	+377.45	-3.05	-06 04.1	- 5.1	19 39 19.2		
18 SU	+21 03 37	- 639	+374.40	-3.16	-06 09.1	- 4.5	19 43 15.8		
19 MO	+20 52 58	- 660	+371.25	-3.26	-06 13.7	- 4.0	19 47 12.3		
20 TU	+20 41 58	- 681	+367.99	-3.36	-06 17.6	- 3.4	19 51 08.9		
21 WE	+20 30 37	- 701	+364.63	-3.46	-06 21.1	- 2.9	19 55 05.5		
22 TH	+20 18 56	- 722	+361.16	-3.57	-06 23.9	- 2.3	19 59 02.0		
23 FR	+20 06 54	- 742	+357.60	-3.66	-06 26.2	- 1.7	20 02 58.6		
24 SA	+19 54 32	- 762	+353.94	-3.76	-06 27.9	- 1.1	20 06 55.1		
25 SU	+19 41 50	- 781	+350.17	-3.86	-06 29.0	- 0.5	20 10 51.7		
26 MO	+19 28 49	- 801	+346.32	-3.96	-06 29.4	+ 0.2	20 14 48.2		
27 TU	+19 15 28	- 820	+342.36	-4.05	-06 29.3	+ 0.8	20 18 44.8		
28 WE	+19 01 49	- 838	+338.32	-4.14	-06 28.5	+ 1.4	20 22 41.3		
29 TH	+18 47 50	- 857	+334.18	-4.23	-06 27.1	+ 2.0	20 26 37.9		
30 FR	+18 33 34	- 875	+329.94	-4.32	-06 25.1	+ 2.6	20 30 34.4		
31 SA	+18 18 59	- 893	+325.62	-4.41	-06 22.5	+ 3.2	20 34 31.0		

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
AUG 1 SU	+18 04 06	- 911	+321.21	-4.50	-06 19.2	+ 3.9	20 38 27.6			
2 MO	+17 48 55	- 928	+316.72	-4.58	-06 15.4	+ 4.5	20 42 24.1			
3 TU	+17 33 27	- 945	+312.13	-4.67	-06 10.9	+ 5.1	20 46 20.7			
4 WE	+17 17 42	- 962	+307.47	-4.75	-06 05.8	+ 5.7	20 50 17.2			
5 TH	+17 01 40	- 979	+302.71	-4.83	-06 00.1	+ 6.3	20 54 13.8			
6 FR	+16 45 21	- 995	+297.88	-4.91	-05 53.9	+ 6.8	20 58 10.3			
7 SA	+16 28 46	-1011	+292.97	-4.99	-05 47.0	+ 7.4	21 02 06.9			
8 SU	+16 11 55	-1027	+287.98	-5.07	-05 39.6	+ 8.0	21 06 03.4			
9 MO	+15 54 49	-1042	+282.91	-5.15	-05 31.6	+ 8.6	21 10 00.0			
10 TU	+15 37 27	-1057	+277.76	-5.22	-05 23.0	+ 9.1	21 13 56.5			
11 WE	+15 19 50	-1072	+272.54	-5.29	-05 13.9	+ 9.7	21 17 53.1			
12 TH	+15 01 58	-1086	+267.25	-5.36	-05 04.3	+10.2	21 21 49.6			
13 FR	+14 43 51	-1101	+261.88	-5.44	-04 54.0	+10.7	21 25 46.2			
14 SA	+14 25 31	-1114	+256.45	-5.50	-04 43.3	+11.3	21 29 42.8			
15 SU	+14 06 56	-1128	+250.94	-5.57	-04 32.0	+11.8	21 33 39.3			
16 MO	+13 48 08	-1141	+245.37	-5.63	-04 20.2	+12.3	21 37 35.9			
17 TU	+13 29 07	-1154	+239.74	-5.70	-04 07.9	+12.8	21 41 32.4			
18 WE	+13 09 53	-1166	+234.04	-5.76	-03 55.1	+13.3	21 45 29.0			
19 TH	+12 50 27	-1179	+228.28	-5.82	-03 41.8	+13.8	21 49 25.5			
20 FR	+12 30 48	-1190	+222.46	-5.88	-03 27.9	+14.3	21 53 22.1			
21 SA	+12 10 58	-1202	+216.58	-5.94	-03 13.6	+14.8	21 57 18.6			
22 SU	+11 50 56	-1213	+210.65	-5.99	-02 58.8	+15.3	22 01 15.2			
23 MO	+11 30 43	-1224	+204.66	-6.04	-02 43.6	+15.7	22 05 11.7			
24 TU	+11 10 19	-1234	+198.61	-6.09	-02 27.9	+16.2	22 09 08.3			
25 WE	+10 49 45	-1245	+192.52	-6.15	-02 11.7	+16.6	22 13 04.9			
26 TH	+10 29 00	-1254	+186.37	-6.19	-01 55.1	+17.0	22 17 01.4			
27 FR	+10 08 06	-1264	+180.18	-6.24	-01 38.1	+17.4	22 20 58.0			
28 SA	+ 9 47 02	-1273	+173.94	-6.29	-01 20.7	+17.8	22 24 54.5			
29 SU	+ 9 25 49	-1282	+167.65	-6.33	-01 02.9	+18.1	22 28 51.1			
30 MO	+ 9 04 27	-1291	+161.32	-6.38	-00 44.8	+18.5	22 32 47.6			
31 TU	+ 8 42 56	-1299	+154.94	-6.41	-00 26.3	+18.8	22 36 44.2			

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
SEP 1 WE	+ 8 21 17	-1307	+148.53	-6.45	-00	07.5	+19.1	22	40	40.7
2 TH	+ 7 59 30	-1315	+142.07	-6.49	+00	11.7	+19.4	22	44	37.3
3 FR	+ 7 37 35	-1322	+135.58	-6.53	+00	31.0	+19.7	22	48	33.8
4 SA	+ 7 15 32	-1330	+129.05	-6.57	+00	50.7	+19.9	22	52	30.4
5 SU	+ 6 53 23	-1336	+122.48	-6.60	+01	10.6	+20.1	22	56	26.9
6 MO	+ 6 31 06	-1343	+115.88	-6.63	+01	30.7	+20.3	23	00	23.5
7 TU	+ 6 08 43	-1349	+109.25	-6.66	+01	51.0	+20.5	23	04	20.0
8 WE	+ 5 46 14	-1355	+102.59	-6.69	+02	11.5	+20.7	23	08	16.6
9 TH	+ 5 23 39	-1361	+ 95.90	-6.72	+02	32.2	+20.8	23	12	13.1
10 FR	+ 5 00 58	-1366	+ 89.18	-6.75	+02	53.0	+20.9	23	16	09.7
11 SA	+ 4 38 12	-1371	+ 82.43	-6.77	+03	13.9	+21.0	23	20	06.3
12 SU	+ 4 15 22	-1375	+ 75.66	-6.79	+03	35.0	+21.1	23	24	02.8
13 MO	+ 3 52 27	-1379	+ 68.87	-6.81	+03	56.1	+21.2	23	27	59.4
14 TU	+ 3 29 27	-1383	+ 62.06	-6.83	+04	17.2	+21.2	23	31	55.9
15 WE	+ 3 06 24	-1387	+ 55.23	-6.85	+04	38.5	+21.3	23	35	52.5
16 TH	+ 2 43 17	-1390	+ 48.38	-6.86	+04	59.7	+21.3	23	39	49.0
17 FR	+ 2 20 07	-1393	+ 41.52	-6.88	+05	21.0	+21.3	23	43	45.6
18 SA	+ 1 56 55	-1395	+ 34.64	-6.89	+05	42.3	+21.3	23	47	42.1
19 SU	+ 1 33 40	-1397	+ 27.75	-6.90	+06	03.6	+21.3	23	51	38.7
20 MO	+ 1 10 22	-1399	+ 20.85	-6.91	+06	24.8	+21.2	23	55	35.2
21 TU	+ 0 47 04	-1400	+ 13.94	-6.91	+06	46.0	+21.1	23	59	31.8
22 WE	+ 0 23 43	-1401	+ 7.03	-6.92	+07	07.2	+21.1	0	03	28.3
23 TH	+ 0 00 22	-1402	+ 0.11	-6.92	+07	28.2	+21.0	0	07	24.9
24 FR	- 0 23 00	-1402	- 6.81	-6.92	+07	49.2	+20.8	0	11	21.5
25 SA	- 0 46 22	-1402	- 13.74	-6.92	+08	10.1	+20.7	0	15	18.0
26 SU	- 1 09 44	-1402	- 20.66	-6.92	+08	30.7	+20.5	0	19	14.6
27 MO	- 1 33 06	-1401	- 27.58	-6.92	+08	51.3	+20.3	0	23	11.1
28 TU	- 1 56 27	-1400	- 34.50	-6.91	+09	11.6	+20.1	0	27	07.7
29 WE	- 2 19 47	-1399	- 41.42	-6.91	+09	31.7	+19.9	0	31	04.2
30 TH	- 2 43 06	-1397	- 48.33	-6.90	+09	51.6	+19.6	0	35	00.8

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS						
	°	' "	DAILY CHANGE (SEC)	DAILY CHANGE (MILS)	MIN	SEC	DAILY CHANGE (SEC)	HR	MIN SEC
OCT 1 FR	- 3	06 24		- 55.23	+10	11.3		0	38 57.3
2 SA	- 3	29 39	-1395	- 62.12	+10	30.6	+19.3	0	42 53.8
3 SU	- 3	52 52	-1393	- 69.00	+10	49.6	+19.0	0	46 50.4
4 MO	- 4	16 03	-1390	- 75.87	+11	08.3	+18.7	0	50 46.9
5 TU	- 4	39 10	-1388	- 82.72	+11	26.7	+18.4	0	54 43.5
6 WE	- 5	02 14	-1384	- 89.55	+11	44.7	+18.0	0	58 40.1
7 TH	- 5	25 15	-1381	- 96.37	+12	02.3	+17.6	1	02 36.6
8 FR	- 5	48 11	-1376	-103.17	+12	19.4	+17.2	1	06 33.2
9 SA	- 6	11 04	-1372	-109.94	+12	36.1	+16.7	1	10 29.7
10 SU	- 6	33 51	-1367	-116.70	+12	52.4	+16.3	1	14 26.3
11 MO	- 6	56 33	-1362	-123.42	+13	08.2	+15.8	1	18 22.8
12 TU	- 7	19 10	-1357	-130.12	+13	23.4	+15.3	1	22 19.4
13 WE	- 7	41 40	-1351	-136.79	+13	38.2	+14.8	1	26 15.9
14 TH	- 8	04 04	-1344	-143.43	+13	52.4	+14.2	1	30 12.5
15 FR	- 8	26 22	-1338	-150.03	+14	06.1	+13.7	1	34 09.0
16 SA	- 8	48 32	-1330	-156.60	+14	19.2	+13.1	1	38 05.6
17 SU	- 9	10 35	-1323	-163.14	+14	31.8	+12.6	1	42 02.1
18 MO	- 9	32 30	-1315	-169.63	+14	43.7	+12.0	1	45 58.7
19 TU	- 9	54 17	-1307	-176.08	+14	55.1	+11.4	1	49 55.3
20 WE	-10	15 55	-1298	-182.49	+15	05.9	+10.8	1	53 51.8
21 TH	-10	37 24	-1289	-188.86	+15	16.0	+10.1	1	57 48.4
22 FR	-10	58 43	-1279	-195.17	+15	25.5	+ 9.5	2	01 44.9
23 SA	-11	19 52	-1269	-201.44	+15	34.4	+ 8.9	2	05 41.5
24 SU	-11	40 51	-1259	-207.66	+15	42.6	+ 8.2	2	09 38.0
25 MO	-12	01 39	-1248	-213.82	+15	50.1	+ 7.5	2	13 34.6
26 TU	-12	22 17	-1237	-219.93	+15	56.9	+ 6.8	2	17 31.1
27 WE	-12	42 42	-1226	-225.99	+15	56.9	+ 6.1	2	17 31.1
28 TH	-13	02 56	-1214	-231.98	+16	02.9	+ 6.1	2	21 27.7
29 FR	-13	22 58	-1202	-237.92	+16	08.3	+ 5.4	2	25 24.2
30 SA	-13	42 47	-1189	-243.79	+16	12.9	+ 4.6	2	29 20.8
31 SU	-14	02 23	-1176	-249.59	+16	16.8	+ 3.9	2	33 17.3
			-1163	-5.74	+16	19.9	+ 3.1	2	37 13.9
							+ 2.3		

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS				DAILY CHANGE (SEC)			
	°	'	''	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)		MIN	SEC	
NOV 1 MO	-14	21	45		-255.34			+16	22.1	2 41 10.4
2 TU	-14	40	54	-1149	-261.01	-5.67	+ 1.5	2	45	07.0
3 WE	-14	59	49	-1135	-266.61	-5.60	+ 0.7	2	49	03.6
4 TH	-15	18	29	-1120	-272.14	-5.53	- 0.1	2	53	00.1
5 FR	-15	36	54	-1105	-277.60	-5.46	- 1.0	2	56	56.7
6 SA	-15	55	03	-1090	-282.98	-5.38	- 1.8	3	00	53.2
7 SU	-16	12	57	-1074	-288.28	-5.30	- 2.7	3	04	49.8
8 MO	-16	30	35	-1058	-293.51	-5.22	- 3.5	3	08	46.3
9 TU	-16	47	56	-1041	-298.65	-5.14	- 4.4	3	12	42.9
10 WE	-17	05	00	-1024	-303.70	-5.06	- 5.3	3	16	39.4
11 TH	-17	21	46	-1006	-308.67	-4.97	- 6.1	3	20	36.0
12 FR	-17	38	15	- 989	-313.55	-4.88	- 7.0	3	24	32.5
13 SA	-17	54	25	- 970	-318.35	-4.79	- 7.9	3	28	29.1
14 SU	-18	10	17	- 952	-323.05	-4.70	- 8.7	3	32	25.7
15 MO	-18	25	49	- 933	-327.65	-4.61	- 9.6	3	36	22.2
16 TU	-18	41	02	- 913	-332.16	-4.51	-10.4	3	40	18.8
17 WE	-18	55	55	- 893	-336.57	-4.41	-11.2	3	44	15.3
18 TH	-19	10	28	- 873	-340.88	-4.31	-12.0	3	48	11.9
19 FR	-19	24	41	- 852	-345.09	-4.21	-12.9	3	52	08.5
20 SA	-19	38	32	- 831	-349.19	-4.10	-13.7	3	56	05.0
21 SU	-19	52	02	- 810	-353.19	-4.00	-14.5	4	00	01.6
22 MO	-20	05	10	- 788	-357.09	-3.89	-15.2	4	03	58.1
23 TU	-20	17	56	- 766	-360.87	-3.78	-16.0	4	07	54.7
24 WE	-20	30	19	- 744	-364.54	-3.67	-16.8	4	11	51.2
25 TH	-20	42	20	- 721	-368.10	-3.56	-17.5	4	15	47.8
26 FR	-20	53	58	- 698	-371.54	-3.45	-18.3	4	19	44.3
27 SA	-21	05	12	- 674	-374.87	-3.33	-19.0	4	23	40.9
28 SU	-21	16	02	- 650	-378.09	-3.21	-19.7	4	27	37.4
29 MO	-21	26	29	- 626	-381.18	-3.09	-20.4	4	31	34.0
30 TU	-21	36	31	- 602	-384.15	-2.97	-21.1	4	35	30.6
				- 577		-2.85	-21.8			

Table 2a. Sun, 1993, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME			
	DEGREES		DAILY CHANGE (SEC)	MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "		MILS	DAILY CHANGE (MILS)						
DEC 1 WE	-21	46 08	- 552	-387.00	-2.73	+11	05.7	-22.5	4	39	27.1
2 TH	-21	55 20	- 527	-389.73	-2.60	+10	43.2	-23.1	4	43	23.7
3 FR	-22	04 08	- 502	-392.33	-2.48	+10	20.1	-23.7	4	47	20.3
4 SA	-22	12 29	- 476	-394.81	-2.35	+09	56.4	-24.3	4	51	16.8
5 SU	-22	20 25	- 450	-397.16	-2.22	+09	32.1	-24.9	4	55	13.4
6 MO	-22	27 55	- 424	-399.38	-2.09	+09	07.2	-25.4	4	59	09.9
7 TU	-22	34 59	- 397	-401.48	-1.96	+08	41.8	-26.0	5	03	06.5
8 WE	-22	41 36	- 370	-403.44	-1.83	+08	15.8	-26.5	5	07	03.0
9 TH	-22	47 46	- 343	-405.27	-1.69	+07	49.3	-26.9	5	10	59.6
10 FR	-22	53 30	- 316	-406.96	-1.56	+07	22.4	-27.4	5	14	56.1
11 SA	-22	58 46	- 289	-408.52	-1.43	+06	55.0	-27.8	5	18	52.7
12 SU	-23	03 35	- 262	-409.95	-1.29	+06	27.2	-28.2	5	22	49.3
13 MO	-23	07 57	- 234	-411.24	-1.16	+05	59.1	-28.5	5	26	45.8
14 TU	-23	11 51	- 206	-412.40	-1.02	+05	30.6	-28.8	5	30	42.4
15 WE	-23	15 17	- 179	-413.42	-0.88	+05	01.8	-29.0	5	34	38.9
16 TH	-23	18 16	- 151	-414.30	-0.75	+04	32.8	-29.3	5	38	35.5
17 FR	-23	20 47	- 123	-415.05	-0.61	+04	03.5	-29.4	5	42	32.1
18 SA	-23	22 49	- 95	-415.65	-0.47	+03	34.1	-29.6	5	46	28.6
19 SU	-23	24 24	- 66	-416.12	-0.33	+03	04.5	-29.7	5	50	25.2
20 MO	-23	25 30	- 38	-416.45	-0.19	+02	34.8	-29.8	5	54	21.7
21 TU	-23	26 08	- 10	-416.63	-0.05	+02	05.0	-29.8	5	58	18.3
22 WE	-23	26 18	+ 18	-416.68	+0.09	+01	35.2	-29.8	6	02	14.8
23 TH	-23	26 00	+ 46	-416.59	+0.23	+01	05.4	-29.8	6	06	11.4
24 FR	-23	25 14	+ 75	-416.36	+0.37	+00	35.6	-29.8	6	10	07.9
25 SA	-23	23 59	+ 103	-415.99	+0.51	+00	05.8	-29.7	6	14	04.5
26 SU	-23	22 16	+ 131	-415.49	+0.65	-00	23.8	-29.5	6	18	01.1
27 MO	-23	20 05	+ 159	-414.84	+0.79	-00	53.4	-29.4	6	21	57.6
28 TU	-23	17 26	+ 187	-414.05	+0.92	-01	22.8	-29.2	6	25	54.2
29 WE	-23	14 19	+ 215	-413.13	+1.06	-01	52.0	-29.0	6	29	50.7
30 TH	-23	10 44	+ 243	-412.07	+1.20	-02	21.0	-28.8	6	33	47.3
31 FR	-23	06 41	+ 271	-410.87	+1.34	-02	49.8	-28.5	6	37	43.9
32 SA	-23	02 10		-409.53		-03	18.3		6	41	40.4

Table 2b. Sun, 1994, for zero hours universal time (GMT)

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME			
	DEGREES		DAILY CHANGE (SEC)	MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "		MILS	DAILY CHANGE (MILS)						
JAN 0 FR	-23	06 41		-410.87		-02	49.8		6	37	43.9
JAN 1 SA	-23	02 10	+ 271	-409.53	+1.34	-03	18.3	-28.5	6	41	40.4
2 SU	-22	57 12	+ 298	-408.06	+1.47	-03	46.5	-28.2	6	45	37.0
3 MO	-22	51 46	+ 326	-406.45	+1.61	-04	14.4	-27.9	6	49	33.5
4 TU	-22	45 53	+ 353	-404.71	+1.74	-04	42.0	-27.6	6	53	30.1
5 WE	-22	39 33	+ 380	-402.83	+1.88	-05	09.1	-27.2	6	57	26.6
6 TH	-22	32 46	+ 407	-400.82	+2.01	-05	35.9	-26.8	7	01	23.2
7 FR	-22	25 32	+ 434	-398.67	+2.14	-06	02.3	-26.3	7	05	19.8
8 SA	-22	17 51	+ 461	-396.40	+2.28	-06	28.2	-25.9	7	09	16.3
9 SU	-22	09 44	+ 487	-394.00	+2.40	-06	53.6	-25.4	7	13	12.9
10 MO	-22	01 11	+ 513	-391.46	+2.53	-07	18.4	-24.9	7	17	09.4
11 TU	-21	52 12	+ 539	-388.80	+2.66	-07	42.8	-24.3	7	21	06.0
12 WE	-21	42 48	+ 564	-386.01	+2.79	-08	06.5	-23.8	7	25	02.6
13 TH	-21	32 58	+ 590	-383.10	+2.91	-08	29.7	-23.2	7	28	59.1
14 FR	-21	22 43	+ 615	-380.07	+3.04	-08	52.2	-22.5	7	32	55.7
15 SA	-21	12 04	+ 639	-376.91	+3.16	-09	14.1	-21.9	7	36	52.2
16 SU	-21	01 00	+ 664	-373.63	+3.28	-09	35.3	-21.2	7	40	48.8
17 MO	-20	49 33	+ 688	-370.24	+3.40	-09	55.8	-20.5	7	44	45.3
18 TU	-20	37 41	+ 711	-366.72	+3.51	-10	15.6	-19.8	7	48	41.9
19 WE	-20	25 26	+ 735	-363.09	+3.63	-10	34.7	-19.1	7	52	38.4
20 TH	-20	12 49	+ 758	-359.35	+3.74	-10	53.0	-18.3	7	56	35.0
21 FR	-19	59 48	+ 781	-355.50	+3.86	-11	10.5	-17.6	8	00	31.6
22 SA	-19	46 25	+ 803	-351.53	+3.97	-11	27.3	-16.8	8	04	28.1
23 SU	-19	32 40	+ 825	-347.46	+4.07	-11	43.3	-16.0	8	08	24.7
24 MO	-19	18 33	+ 847	-343.28	+4.18	-11	58.5	-15.2	8	12	21.2
25 TU	-19	04 05	+ 868	-338.99	+4.29	-12	12.9	-14.4	8	16	17.8
26 WE	-18	49 17	+ 889	-334.60	+4.39	-12	26.5	-13.6	8	20	14.4
27 TH	-18	34 07	+ 909	-330.11	+4.49	-12	39.3	-12.8	8	24	10.9
28 FR	-18	18 38	+ 930	-325.52	+4.59	-12	51.3	-12.0	8	28	07.5
29 SA	-18	02 48	+ 949	-320.83	+4.69	-13	02.5	-11.2	8	32	04.0
30 SU	-17	46 39	+ 969	-316.05	+4.79	-13	12.9	-10.4	8	36	00.6
31 MO	-17	30 11	+ 988	-311.17	+4.88	-13	22.4	- 9.6	8	39	57.1
			+1007		+4.97			- 8.8			

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN SEC		DAILY CHANGE (SEC)	HR MIN SEC		
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
FEB 1 TU	-17 13 25		-306.20		-13 31.2			8 43 53.7		
2 WE	-16 56 20	+1025	-301.13	+5.06	-13 39.2	- 8.0		8 47 50.2		
3 TH	-16 38 57	+1043	-295.98	+5.15	-13 46.3	- 7.2		8 51 46.8		
4 FR	-16 21 16	+1061	-290.75	+5.24	-13 52.7	- 6.4		8 55 43.3		
5 SA	-16 03 18	+1078	-285.42	+5.32	-13 58.3	- 5.6		8 59 39.9		
6 SU	-15 45 04	+1094	-280.02	+5.40	-14 03.1	- 4.8		9 03 36.5		
7 MO	-15 26 34	+1111	-274.54	+5.49	-14 07.1	- 4.0		9 07 33.0		
8 TU	-15 07 47	+1126	-268.97	+5.56	-14 10.3	- 3.2		9 11 29.6		
9 WE	-14 48 46	+1142	-263.34	+5.64	-14 12.8	- 2.4		9 15 26.1		
10 TH	-14 29 29	+1157	-257.62	+5.71	-14 14.4	- 1.7		9 19 22.7		
11 FR	-14 09 58	+1171	-251.84	+5.78	-14 15.3	- 0.9		9 23 19.2		
12 SA	-13 50 13	+1185	-245.99	+5.85	-14 15.4	- 0.1		9 27 15.8		
13 SU	-13 30 14	+1199	-240.07	+5.92	-14 15.4	+ 0.7		9 27 15.8		
14 MO	-13 30 14	+1212	-240.07	+5.99	-14 14.8	+ 1.4		9 31 12.3		
15 TU	-13 10 02	+1225	-234.08	+6.05	-14 13.4	+ 2.2		9 35 08.9		
16 WE	-12 49 37	+1237	-228.03	+6.11	-14 11.2	+ 2.9		9 39 05.4		
17 TH	-12 29 00	+1249	-221.92	+6.17	-14 08.3	+ 3.6		9 43 02.0		
18 FR	-12 08 10	+1261	-215.76	+6.23	-14 04.6	+ 4.4		9 46 58.5		
19 SA	-11 47 10	+1272	-209.53	+6.28	-14 00.3	+ 5.1		9 50 55.1		
20 SU	-11 25 58	+1282	-203.25	+6.33	-13 55.2	+ 5.8		9 54 51.6		
21 MO	-11 04 35	+1293	-196.92	+6.39	-13 49.5	+ 6.4		9 58 48.2		
22 TU	-10 43 03	+1303	-190.53	+6.43	-13 43.0	+ 7.1		10 02 44.8		
23 WE	-10 21 20	+1312	-184.10	+6.48	-13 35.9	+ 7.8		10 06 41.3		
24 TH	- 9 59 28	+1321	-177.62	+6.52	-13 28.2	+ 8.4		10 10 37.9		
25 FR	- 9 37 27	+1330	-171.10	+6.57	-13 19.8	+ 9.0		10 14 34.4		
26 SA	- 9 15 17	+1338	-164.53	+6.61	-13 10.8	+ 9.6		10 18 31.0		
27 SU	- 8 52 59	+1346	-157.92	+6.65	-13 01.2	+10.2		10 22 27.5		
28 MO	- 8 30 33	+1354	-151.27	+6.69	-12 51.0	+10.7		10 26 24.1		
	- 8 07 59	+1361	-144.59	+6.72	-12 40.3	+11.2		10 30 20.6		

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME			
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC	
	°	' "	DAILY CHANGE (SEC)	MILS							DAILY CHANGE (MILS)
MAR 1 TU	- 7	45 18	+1368	-137.87	+6.76	-12	29.1	+11.7	10	34	17.2
2 WE	- 7	22 30	+1374	-131.11	+6.79	-12	17.4	+12.2	10	38	13.7
3 TH	- 6	59 36	+1380	-124.33	+6.81	-12	05.1	+12.7	10	42	10.3
4 FR	- 6	36 36	+1386	-117.51	+6.84	-11	52.5	+13.1	10	46	06.8
5 SA	- 6	13 30	+1391	-110.67	+6.87	-11	39.4	+13.5	10	50	03.4
6 SU	- 5	50 19	+1396	-103.80	+6.89	-11	25.8	+13.9	10	54	00.0
7 MO	- 5	27 03	+1400	- 96.90	+6.91	-11	11.9	+14.3	10	57	56.5
8 TU	- 5	03 42	+1405	- 89.99	+6.94	-10	57.6	+14.7	11	01	53.1
9 WE	- 4	40 18	+1408	- 83.05	+6.95	-10	42.9	+15.0	11	05	49.6
10 TH	- 4	16 49	+1411	- 76.10	+6.97	-10	27.8	+15.4	11	09	46.2
11 FR	- 3	53 18	+1414	- 69.13	+6.98	-10	12.5	+15.7	11	13	42.7
12 SA	- 3	29 44	+1417	- 62.14	+7.00	-09	56.8	+16.0	11	17	39.3
13 SU	- 3	06 07	+1419	- 55.15	+7.01	-09	40.8	+16.3	11	21	35.8
14 MO	- 2	42 28	+1420	- 48.14	+7.01	-09	24.5	+16.6	11	25	32.4
15 TU	- 2	18 48	+1422	- 41.13	+7.02	-09	07.9	+16.8	11	29	28.9
16 WE	- 1	55 06	+1423	- 34.10	+7.03	-08	51.1	+17.0	11	33	25.5
17 TH	- 1	31 23	+1423	- 27.08	+7.03	-08	34.1	+17.3	11	37	22.0
18 FR	- 1	07 40	+1423	- 20.05	+7.03	-08	16.8	+17.4	11	41	18.6
19 SA	- 0	43 57	+1423	- 13.02	+7.03	-07	59.4	+17.6	11	45	15.1
20 SU	- 0	20 14	+1423	- 5.99	+7.03	-07	41.8	+17.8	11	49	11.7
21 MO	+ 0	03 29	+1422	+ 1.03	+7.02	-07	24.0	+17.9	11	53	08.2
22 TU	+ 0	27 11	+1420	+ 8.05	+7.01	-07	06.1	+18.0	11	57	04.8
23 WE	+ 0	50 51	+1419	+ 15.07	+7.01	-06	48.0	+18.1	12	01	01.3
24 TH	+ 1	14 29	+1417	+ 22.07	+7.00	-06	29.9	+18.2	12	04	57.9
25 FR	+ 1	38 06	+1414	+ 29.07	+6.98	-06	11.7	+18.3	12	08	54.5
26 SA	+ 2	01 40	+1412	+ 36.05	+6.97	-05	53.4	+18.3	12	12	51.0
27 SU	+ 2	25 12	+1409	+ 43.02	+6.96	-05	35.2	+18.3	12	16	47.5
28 MO	+ 2	48 41	+1405	+ 49.98	+6.94	-05	16.9	+18.3	12	20	44.1
29 TU	+ 3	12 06	+1402	+ 56.92	+6.92	-04	58.6	+18.2	12	24	40.6
30 WE	+ 3	35 28	+1398	+ 63.84	+6.90	-04	40.4	+18.1	12	28	37.2
31 TH	+ 3	58 45	+1393	+ 70.74	+6.88	-04	22.3	+18.0	12	32	33.7

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS							
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
					MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
APR 1 FR	+ 4 21 59		+ 77.62		-04	04.2		12	36	30.3
2 SA	+ 4 45 08	+1389	+ 84.48	+6.86	-03	46.3	+17.9	12	40	26.9
3 SU	+ 5 08 12	+1384	+ 91.32	+6.83	-03	28.5	+17.8	12	44	23.4
4 MO	+ 5 31 10	+1378	+ 98.12	+6.80	-03	10.9	+17.6	12	48	20.0
5 TU	+ 5 54 03	+1373	+104.90	+6.78	-02	53.4	+17.5	12	52	16.5
6 WE	+ 6 16 49	+1367	+111.65	+6.75	-02	36.2	+17.3	12	56	13.1
7 TH	+ 6 39 30	+1360	+118.37	+6.72	-02	19.1	+17.1	13	00	09.6
8 FR	+ 7 02 03	+1353	+125.05	+6.68	-02	02.3	+16.8	13	04	06.2
9 SA	+ 7 24 29	+1346	+131.70	+6.65	-01	45.7	+16.6	13	08	02.7
10 SU	+ 7 46 48	+1339	+138.31	+6.61	-01	29.3	+16.3	13	11	59.3
11 MO	+ 8 08 59	+1331	+144.88	+6.57	-01	13.3	+16.1	13	15	55.8
12 TU	+ 8 31 02	+1323	+151.42	+6.53	-00	57.5	+15.8	13	19	52.4
13 WE	+ 8 52 56	+1314	+157.90	+6.49	-00	42.0	+15.5	13	23	48.9
14 TH	+ 9 14 41	+1305	+164.35	+6.44	-00	26.8	+15.2	13	27	45.5
15 FR	+ 9 36 17	+1296	+170.75	+6.40	-00	11.9	+14.9	13	31	42.0
16 SA	+ 9 57 43	+1286	+177.10	+6.35	+00	02.6	+14.5	13	35	38.6
17 SU	+10 19 00	+1276	+183.41	+6.30	+00	16.8	+14.2	13	39	35.2
18 MO	+10 40 06	+1266	+189.66	+6.25	+00	30.6	+13.8	13	43	31.7
19 TU	+11 01 01	+1255	+195.86	+6.20	+00	44.0	+13.4	13	47	28.3
20 WE	+11 21 46	+1244	+202.00	+6.14	+00	57.1	+13.1	13	51	24.8
21 TH	+11 42 19	+1233	+208.09	+6.09	+01	09.8	+12.7	13	55	21.4
22 FR	+12 02 40	+1222	+214.12	+6.03	+01	22.0	+12.3	13	59	17.9
23 SA	+12 22 50	+1210	+220.10	+5.98	+01	33.8	+11.8	14	03	14.5
24 SU	+12 42 47	+1197	+226.01	+5.91	+01	45.2	+11.4	14	07	11.0
25 MO	+13 02 32	+1185	+231.86	+5.85	+01	56.2	+10.9	14	11	07.6
26 TU	+13 22 04	+1172	+237.65	+5.79	+01	56.2	+10.5	14	11	07.6
27 WE	+13 41 23	+1159	+243.37	+5.72	+02	06.6	+10.0	14	15	04.1
28 TH	+14 00 28	+1145	+249.03	+5.65	+02	16.6	+10.0	14	19	00.7
29 FR	+14 19 19	+1132	+249.03	+5.65	+02	26.0	+ 9.5	14	22	57.2
30 SA	+14 37 57	+1117	+254.61	+5.59	+02	35.0	+ 8.9	14	26	53.8
		+1117	+254.61	+5.52	+02	43.4	+ 8.4	14	30	50.4
		+1103	+260.13	+5.45			+ 7.9			

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS				DAILY CHANGE (SEC)			
	°	'	''	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)		MIN	SEC	HR MIN SEC
MAY 1 SU	+14	56	20		+265.58			+02	51.3	14 34 46.9
2 MO	+15	14	28	+1088	+270.95	+5.37	+ 7.3	+02	58.6	14 38 43.5
3 TU	+15	32	22	+1073	+276.25	+5.30	+ 6.8	+03	05.3	14 42 40.0
4 WE	+15	49	59	+1058	+281.48	+5.22	+ 6.2	+03	11.5	14 46 36.6
5 TH	+16	07	22	+1042	+286.62	+5.15	+ 5.6	+03	17.1	14 50 33.1
6 FR	+16	24	28	+1026	+291.69	+5.07	+ 5.0	+03	22.2	14 54 29.7
7 SA	+16	41	17	+1010	+296.68	+4.99	+ 4.5	+03	26.6	14 58 26.2
8 SU	+16	57	50	+ 993	+301.58	+4.90	+ 3.9	+03	30.5	15 02 22.8
9 MO	+17	14	07	+ 976	+306.40	+4.82	+ 3.3	+03	33.8	15 06 19.3
10 TU	+17	30	05	+ 959	+311.14	+4.74	+ 2.7	+03	36.6	15 10 15.9
11 WE	+17	45	47	+ 941	+315.79	+4.65	+ 2.2	+03	38.7	15 14 12.4
12 TH	+18	01	10	+ 923	+320.35	+4.56	+ 1.6	+03	40.3	15 18 09.0
13 FR	+18	16	15	+ 905	+324.82	+4.47	+ 1.0	+03	41.3	15 22 05.6
14 SA	+18	31	02	+ 887	+329.20	+4.38	+ 0.5	+03	41.8	15 26 02.1
15 SU	+18	45	30	+ 868	+333.48	+4.29	- 0.1	+03	41.7	15 29 58.7
16 MO	+18	59	39	+ 849	+337.68	+4.19	- 0.7	+03	41.0	15 33 55.2
17 TU	+19	13	29	+ 830	+341.77	+4.10	- 1.2	+03	39.8	15 37 51.8
18 WE	+19	26	59	+ 810	+345.77	+4.00	- 1.8	+03	38.0	15 41 48.3
19 TH	+19	40	09	+ 790	+349.68	+3.90	- 2.3	+03	35.8	15 45 44.9
20 FR	+19	53	00	+ 770	+353.48	+3.80	- 2.8	+03	32.9	15 49 41.5
21 SA	+20	05	29	+ 750	+357.18	+3.70	- 3.3	+03	29.6	15 53 38.0
22 SU	+20	17	38	+ 729	+360.78	+3.60	- 3.9	+03	25.7	15 57 34.6
23 MO	+20	29	27	+ 708	+364.28	+3.50	- 4.4	+03	21.4	16 01 31.1
24 TU	+20	40	54	+ 687	+367.67	+3.39	- 4.9	+03	16.5	16 05 27.7
25 WE	+20	52	00	+ 666	+370.96	+3.29	- 5.4	+03	11.1	16 09 24.2
26 TH	+21	02	44	+ 644	+374.14	+3.18	- 5.9	+03	05.2	16 13 20.8
27 FR	+21	13	06	+ 623	+377.22	+3.08	- 6.4	+02	58.8	16 17 17.3
28 SA	+21	23	07	+ 601	+380.18	+2.97	- 6.9	+02	52.0	16 21 13.9
29 SU	+21	32	46	+ 578	+383.04	+2.85	- 7.3	+02	44.7	16 25 10.5
30 MO	+21	42	02	+ 556	+385.79	+2.75	- 7.8	+02	36.8	16 29 07.0
31 TU	+21	50	55	+ 533	+388.42	+2.63	- 8.3	+02	28.6	16 33 03.6
				+ 511		+2.52	- 8.7			

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		DAILY CHANGE (SEC)	MILS		DAILY CHANGE (SEC)		HR	MIN	SEC
	°	' "		MILS	DAILY CHANGE (MILS)	MIN	SEC			
JUN 1 WE	+21	59 26		+390.94		+02	19.9	16	37	00.1
2 TH	+22	07 34	+ 488	+393.35	+2.41	+02	10.8	16	40	56.7
3 FR	+22	15 18	+ 465	+395.64	+2.30	+02	01.2	16	44	53.2
4 SA	+22	22 39	+ 441	+397.82	+2.18	+01	51.3	16	48	49.8
5 SU	+22	29 37	+ 418	+399.89	+2.06	+01	41.0	16	52	46.3
6 MO	+22	36 11	+ 394	+401.83	+1.95	+01	30.4	16	56	42.9
7 TU	+22	42 22	+ 370	+403.66	+1.83	+01	19.4	17	00	39.5
8 WE	+22	48 08	+ 346	+405.37	+1.71	+01	08.1	17	04	36.0
9 TH	+22	53 30	+ 322	+406.97	+1.59	+00	56.6	17	08	32.6
10 FR	+22	58 29	+ 298	+408.44	+1.47	+00	44.8	17	12	29.1
11 SA	+23	03 03	+ 274	+409.79	+1.35	+00	32.7	17	16	25.7
12 SU	+23	07 13	+ 250	+411.02	+1.23	+00	20.5	17	20	22.3
13 MO	+23	10 58	+ 225	+412.14	+1.11	+00	08.0	17	24	18.8
14 TU	+23	14 19	+ 201	+413.13	+0.99	-00	04.6	17	28	15.4
15 WE	+23	17 15	+ 176	+414.00	+0.87	-00	17.3	17	32	11.9
16 TH	+23	19 46	+ 152	+414.75	+0.75	-00	30.1	17	36	08.5
17 FR	+23	21 53	+ 127	+415.37	+0.63	-00	43.0	17	40	05.0
18 SA	+23	23 35	+ 102	+415.88	+0.50	-00	56.0	17	44	01.6
19 SU	+23	24 53	+ 77	+416.26	+0.38	-01	08.9	17	47	58.1
20 MO	+23	25 45	+ 53	+416.52	+0.26	-01	22.0	17	51	54.7
21 TU	+23	26 13	+ 28	+416.66	+0.14	-01	34.9	17	55	51.3
22 WE	+23	26 16	+ 3	+416.67	+0.01	-01	47.9	17	59	47.8
23 TH	+23	25 54	- 22	+416.56	-0.11	-02	00.8	18	03	44.4
24 FR	+23	25 08	- 47	+416.33	-0.23	-02	13.7	18	07	40.9
25 SA	+23	23 56	- 71	+415.98	-0.35	-02	26.4	18	11	37.5
26 SU	+23	22 20	- 96	+415.51	-0.47	-02	39.1	18	15	34.1
27 MO	+23	20 20	- 121	+414.91	-0.60	-02	51.6	18	19	30.6
28 TU	+23	17 54	- 145	+414.19	-0.72	-03	04.0	18	23	27.2
29 WE	+23	15 04	- 170	+413.36	-0.84	-03	16.3	18	27	23.7
30 TH	+23	11 50	- 194	+412.40	-0.96	-03	28.3	18	31	20.3
			- 219		-1.08		-11.8			

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME			
	DEGREES		DAILY CHANGE (SEC)	MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	'									
JUL 1 FR	+23	08 11		+411.31		-03	40.1		18	35	16.8
2 SA	+23	04 08	- 243	+410.11	-1.20	-03	51.7	-11.6	18	39	13.4
3 SU	+22	59 41	- 267	+408.79	-1.32	-04	03.1	-11.4	18	43	09.9
4 MO	+22	54 49	- 292	+407.35	-1.44	-04	14.2	-11.1	18	47	06.5
5 TU	+22	49 34	- 315	+405.80	-1.56	-04	25.0	-10.8	18	51	03.1
6 WE	+22	43 54	- 339	+404.12	-1.67	-04	35.5	-10.5	18	54	59.6
7 TH	+22	37 51	- 363	+402.33	-1.79	-04	45.6	-10.1	18	58	56.2
8 FR	+22	31 25	- 387	+400.42	-1.91	-04	55.4	- 9.8	19	02	52.7
9 SA	+22	24 35	- 410	+398.39	-2.02	-05	04.8	- 9.4	19	06	49.3
10 SU	+22	17 22	- 433	+396.25	-2.14	-05	13.8	- 9.0	19	10	45.9
11 MO	+22	09 45	- 456	+394.00	-2.25	-05	22.3	- 8.6	19	14	42.4
12 TU	+22	01 46	- 479	+391.64	-2.37	-05	30.4	- 8.1	19	18	39.0
13 WE	+21	53 25	- 502	+389.16	-2.48	-05	38.1	- 7.6	19	22	35.5
14 TH	+21	44 41	- 524	+386.57	-2.59	-05	45.2	- 7.2	19	26	32.1
15 FR	+21	35 35	- 546	+383.87	-2.70	-05	51.9	- 6.7	19	30	28.6
16 SA	+21	26 06	- 568	+381.07	-2.80	-05	58.0	- 6.1	19	34	25.2
17 SU	+21	16 16	- 590	+378.15	-2.91	-06	03.7	- 5.6	19	38	21.7
18 MO	+21	06 04	- 612	+375.13	-3.02	-06	08.7	- 5.1	19	42	18.3
19 TU	+20	55 31	- 633	+372.01	-3.13	-06	13.2	- 4.5	19	46	14.9
20 WE	+20	44 37	- 654	+368.77	-3.23	-06	17.2	- 4.0	19	50	11.4
21 TH	+20	33 22	- 675	+365.44	-3.33	-06	20.6	- 3.4	19	54	08.0
22 FR	+20	21 46	- 696	+362.00	-3.44	-06	23.4	- 2.8	19	58	04.5
23 SA	+20	09 50	- 716	+358.47	-3.54	-06	25.6	- 2.2	20	02	01.1
24 SU	+19	57 33	- 736	+354.83	-3.63	-06	27.3	- 1.7	20	05	57.7
25 MO	+19	44 57	- 756	+351.09	-3.73	-06	28.4	- 1.1	20	09	54.2
26 TU	+19	32 01	- 776	+347.26	-3.83	-06	28.9	- 0.5	20	13	50.8
27 WE	+19	18 45	- 796	+343.33	-3.93	-06	28.8	+ 0.1	20	17	47.3
28 TH	+19	05 10	- 815	+339.31	-4.02	-06	28.1	+ 0.7	20	21	43.9
29 FR	+18	51 16	- 834	+335.19	-4.12	-06	26.9	+ 1.2	20	25	40.4
30 SA	+18	37 03	- 853	+330.98	-4.21	-06	25.1	+ 1.8	20	29	37.0
31 SU	+18	22 32	- 871	+326.68	-4.30	-06	22.6	+ 2.4	20	33	33.5
			- 889		-4.39			+ 3.0			

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME			
	DEGREES		DAILY CHANGE (SEC)	MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	'									
AUG 1 MO	+18	07 43	- 907	+322.29	-4.48	-06	19.6	+ 3.6	20	37	30.1
2 TU	+17	52 36	- 925	+317.81	-4.57	-06	16.0	+ 4.2	20	41	26.6
3 WE	+17	37 12	- 942	+313.24	-4.65	-06	11.8	+ 4.8	20	45	23.2
4 TH	+17	21 30	- 959	+308.59	-4.74	-06	07.0	+ 5.4	20	49	19.8
5 FR	+17	05 31	- 975	+303.86	-4.81	-06	01.6	+ 6.0	20	53	16.3
6 SA	+16	49 16	- 992	+299.04	-4.90	-05	55.7	+ 6.6	20	57	12.9
7 SU	+16	32 44	-1008	+294.14	-4.98	-05	49.1	+ 7.2	21	01	09.4
8 MO	+16	15 57	-1023	+289.17	-5.05	-05	42.0	+ 7.7	21	05	06.0
9 TU	+15	58 53	-1039	+284.12	-5.13	-05	34.2	+ 8.3	21	09	02.5
10 WE	+15	41 35	-1054	+278.99	-5.20	-05	25.9	+ 8.9	21	12	59.1
11 TH	+15	24 01	-1068	+273.78	-5.27	-05	17.0	+ 9.5	21	16	55.6
12 FR	+15	06 13	-1083	+268.51	-5.35	-05	07.5	+10.1	21	20	52.2
13 SA	+14	48 10	-1097	+263.16	-5.42	-04	57.4	+10.7	21	24	48.7
14 SU	+14	29 54	-1111	+257.75	-5.49	-04	46.7	+11.2	21	28	45.3
15 MO	+14	11 23	-1124	+252.26	-5.55	-04	35.5	+11.8	21	32	41.8
16 TU	+13	52 39	-1137	+246.71	-5.61	-04	23.7	+12.3	21	36	38.4
17 WE	+13	33 42	-1150	+241.10	-5.68	-04	11.4	+12.9	21	40	35.0
18 TH	+13	14 32	-1162	+235.42	-5.74	-03	58.5	+13.4	21	44	31.5
19 FR	+12	55 10	-1175	+229.68	-5.80	-03	45.2	+13.9	21	48	28.1
20 SA	+12	35 35	-1187	+223.88	-5.86	-03	31.3	+14.4	21	52	24.6
21 SU	+12	15 49	-1198	+218.02	-5.92	-03	16.9	+14.8	21	56	21.2
22 MO	+11	55 50	-1210	+212.10	-5.98	-03	02.1	+15.3	22	00	17.7
23 TU	+11	35 41	-1221	+206.13	-6.03	-02	46.8	+15.7	22	04	14.3
24 WE	+11	15 20	-1231	+200.10	-6.08	-02	31.1	+16.1	22	08	10.8
25 TH	+10	54 49	-1242	+194.02	-6.13	-02	14.9	+16.6	22	12	07.4
26 FR	+10	34 07	-1252	+187.89	-6.18	-01	58.4	+16.9	22	16	03.9
27 SA	+10	13 15	-1262	+181.70	-6.23	-01	41.4	+17.3	22	20	00.5
28 SU	+ 9	52 13	-1271	+175.47	-6.28	-01	24.1	+17.7	22	23	57.0
29 MO	+ 9	31 02	-1281	+169.19	-6.33	-01	06.5	+18.0	22	27	53.6
30 TU	+ 9	09 41	-1289	+162.87	-6.37	-00	48.5	+18.3	22	31	50.1
31 WE	+ 8	48 12	-1298	+156.50	-6.41	-00	30.1	+18.6	22	35	46.7

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
SEP 1 TH	+ 8 26 34		+150.09		-00	11.5		22	39	43.3
2 FR	+ 8 04 48	-1306	+143.64	-6.45	+00	07.4	+18.9	22	43	39.8
3 SA	+ 7 42 54	-1314	+137.16	-6.49	+00	26.6	+19.2	22	47	36.4
4 SU	+ 7 20 53	-1321	+130.63	-6.52	+00	46.1	+19.5	22	51	32.9
5 MO	+ 6 58 44	-1329	+124.07	-6.56	+01	05.8	+19.7	22	55	29.5
6 TU	+ 6 36 29	-1335	+117.47	-6.59	+01	25.7	+19.9	22	59	26.0
7 WE	+ 6 14 07	-1342	+110.85	-6.63	+01	45.8	+20.1	23	03	22.6
8 TH	+ 5 51 39	-1348	+104.19	-6.66	+02	06.2	+20.4	23	07	19.1
9 FR	+ 5 29 05	-1354	+ 97.51	-6.69	+02	26.7	+20.5	23	11	15.7
10 SA	+ 5 06 26	-1359	+ 90.79	-6.71	+02	47.5	+20.7	23	15	12.2
11 SU	+ 4 43 41	-1364	+ 84.06	-6.74	+02	47.5	+20.9	23	15	12.2
12 MO	+ 4 20 52	-1369	+ 84.06	-6.76	+03	08.3	+21.0	23	19	08.8
13 TU	+ 4 20 52	-1374	+ 77.29	-6.79	+03	29.4	+21.1	23	23	05.3
14 WE	+ 3 57 59	-1378	+ 70.51	-6.80	+03	50.5	+21.3	23	27	01.9
15 TH	+ 3 35 01	-1381	+ 63.71	-6.82	+04	11.8	+21.3	23	30	58.4
16 FR	+ 3 11 59	-1385	+ 56.89	-6.84	+04	33.1	+21.4	23	34	55.0
17 SA	+ 2 48 55	-1388	+ 50.05	-6.85	+04	54.5	+21.4	23	38	51.6
18 SU	+ 2 25 46	-1391	+ 43.19	-6.87	+05	15.9	+21.4	23	42	48.1
19 MO	+ 2 02 35	-1393	+ 36.32	-6.88	+05	37.4	+21.5	23	46	44.7
20 TU	+ 1 39 22	-1396	+ 29.44	-6.89	+05	58.9	+21.5	23	50	41.2
21 WE	+ 1 16 06	-1398	+ 22.55	-6.90	+05	58.9	+21.4	23	50	41.2
22 TH	+ 0 52 49	-1399	+ 15.65	-6.91	+06	20.3	+21.4	23	54	37.8
23 FR	+ 0 29 30	-1400	+ 8.74	-6.91	+06	41.6	+21.3	23	58	34.3
24 SA	+ 0 06 09	-1401	+ 1.82	-6.92	+07	02.9	+21.3	0	02	30.8
25 SU	- 0 17 12	-1402	+ 1.82	-6.92	+07	24.1	+21.2	0	06	27.4
26 MO	- 0 17 12	-1402	- 5.10	-6.92	+07	45.2	+21.1	0	10	23.9
27 TU	- 0 40 34	-1402	- 12.02	-6.92	+07	45.2	+20.9	0	10	23.9
28 WE	- 1 03 57	-1402	- 18.95	-6.92	+08	06.1	+20.9	0	14	20.5
29 TH	- 1 03 57	-1402	- 18.95	-6.92	+08	26.9	+20.7	0	18	17.1
30 FR	- 1 27 19	-1402	- 25.87	-6.92	+08	26.9	+20.6	0	18	17.1
	- 1 27 19	-1402	- 25.87	-6.92	+08	47.4	+20.3	0	22	13.6
	- 1 50 41	-1401	- 32.79	-6.92	+09	07.8	+20.1	0	26	10.2
	- 2 14 02	-1400	- 39.71	-6.92	+09	07.8	+20.1	0	26	10.2
	- 2 14 02	-1401	- 39.71	-6.92	+09	27.9	+20.1	0	30	06.7
	- 2 37 22	-1400	- 46.63	-6.91	+09	27.9	+19.9	0	30	06.7
	- 2 37 22	-1398	- 46.63	-6.91	+09	47.7	+19.9	0	34	03.3
		-1398		-6.90	+09	47.7	+19.6	0	34	03.3

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME			
	DEGREES		DAILY CHANGE (SEC)	MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "		MILS	DAILY CHANGE (MILS)						
OCT 1 SA	- 3	00 40		- 53.53		+10	07.3		0	37	59.8
2 SU	- 3	23 57	-1397	- 60.43	-6.90	+10	26.6	+19.3	0	41	56.4
3 MO	- 3	47 11	-1394	- 67.32	-6.88	+10	45.6	+19.0	0	45	52.9
4 TU	- 4	10 23	-1392	- 74.19	-6.87	+11	04.2	+18.6	0	49	49.5
5 WE	- 4	33 32	-1389	- 81.05	-6.86	+11	22.5	+18.3	0	53	46.0
6 TH	- 4	56 38	-1386	- 87.89	-6.84	+11	40.4	+17.9	0	57	42.6
7 FR	- 5	19 39	-1382	- 94.71	-6.82	+11	58.0	+17.6	1	01	39.1
8 SA	- 5	42 37	-1378	-101.52	-6.80	+12	15.1	+17.2	1	05	35.7
9 SU	- 6	05 30	-1373	-108.30	-6.78	+12	31.9	+16.8	1	09	32.2
10 MO	- 6	28 19	-1368	-115.06	-6.76	+12	48.2	+16.3	1	13	28.8
11 TU	- 6	51 02	-1363	-121.79	-6.73	+13	04.1	+15.9	1	17	25.4
12 WE	- 7	13 39	-1358	-128.49	-6.71	+13	19.6	+15.4	1	21	21.9
13 TH	- 7	36 11	-1352	-135.17	-6.68	+13	34.5	+15.0	1	25	18.5
14 FR	- 7	58 36	-1345	-141.81	-6.64	+13	49.0	+14.5	1	29	15.0
15 SA	- 8	20 55	-1338	-148.42	-6.61	+14	03.0	+14.0	1	33	11.6
16 SU	- 8	43 06	-1331	-154.99	-6.57	+14	16.4	+13.4	1	37	08.1
17 MO	- 9	05 10	-1324	-161.53	-6.54	+14	29.3	+12.9	1	41	04.7
18 TU	- 9	27 06	-1316	-168.03	-6.50	+14	41.5	+12.3	1	45	01.2
19 WE	- 9	48 54	-1308	-174.49	-6.46	+14	53.2	+11.7	1	48	57.8
20 TH	-10	10 33	-1299	-180.91	-6.41	+15	04.3	+11.1	1	52	54.3
21 FR	-10	32 04	-1290	-187.28	-6.37	+15	14.7	+10.4	1	56	50.9
22 SA	-10	53 25	-1281	-193.60	-6.33	+15	24.5	+ 9.8	2	00	47.4
23 SU	-11	14 36	-1271	-199.88	-6.28	+15	33.6	+ 9.1	2	04	44.0
24 MO	-11	35 38	-1261	-206.11	-6.23	+15	42.0	+ 8.4	2	08	40.5
25 TU	-11	56 29	-1251	-212.29	-6.18	+15	49.7	+ 7.7	2	12	37.1
26 WE	-12	17 09	-1240	-218.41	-6.12	+15	56.7	+ 7.0	2	16	33.6
27 TH	-12	37 38	-1229	-224.48	-6.07	+16	02.9	+ 6.2	2	20	30.2
28 FR	-12	57 55	-1217	-230.49	-6.01	+16	08.4	+ 5.5	2	24	26.8
29 SA	-13	18 00	-1205	-236.44	-5.95	+16	13.1	+ 4.7	2	28	23.3
30 SU	-13	37 53	-1193	-242.33	-5.89	+16	17.0	+ 3.9	2	32	19.9
31 MO	-13	57 32	-1180	-248.16	-5.83	+16	20.2	+ 3.1	2	36	16.4
			-1166		-5.76			+ 2.3			

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
NOV 1 TU	-14 16 59		-253.92		+16 22.5			2 40 13.0		
2 WE	-14 36 11	-1153	-259.61	-5.69	+16 24.0	+ 1.5		2 44 09.5		
3 TH	-14 55 10	-1139	-265.23	-5.62	+16 24.7	+ 0.7		2 48 06.1		
4 FR	-15 13 54	-1124	-270.79	-5.55	+16 24.6	- 0.1		2 52 02.6		
5 SA	-15 32 23	-1109	-276.26	-5.48	+16 23.7	- 0.9		2 55 59.2		
6 SU	-15 50 37	-1094	-281.66	-5.40	+16 22.0	- 1.7		2 59 55.7		
7 MO	-16 08 35	-1078	-286.99	-5.32	+16 19.4	- 2.6		3 03 52.3		
8 TU	-16 26 16	-1062	-292.23	-5.24	+16 16.0	- 3.4		3 07 48.9		
9 WE	-16 43 41	-1045	-297.39	-5.16	+16 11.8	- 4.2		3 11 45.4		
10 TH	-17 00 49	-1028	-302.47	-5.08	+16 06.8	- 5.0		3 15 42.0		
11 FR	-17 17 40	-1011	-307.46	-4.99	+16 01.0	- 5.9		3 19 38.5		
12 SA	-17 34 12	- 993	-312.36	-4.90	+15 54.3	- 6.7		3 23 35.1		
13 SU	-17 50 27	- 974	-317.17	-4.81	+15 46.8	- 7.5		3 27 31.6		
14 MO	-18 06 23	- 956	-321.89	-4.72	+15 38.4	- 8.3		3 31 28.2		
15 TU	-18 22 00	- 937	-326.52	-4.63	+15 29.2	- 9.2		3 35 24.7		
16 WE	-18 37 17	- 917	-331.05	-4.53	+15 19.2	-10.0		3 39 21.3		
17 TH	-18 52 15	- 898	-335.48	-4.43	+15 08.4	-10.8		3 43 17.8		
18 FR	-19 06 52	- 878	-339.81	-4.34	+14 56.7	-11.7		3 47 14.4		
19 SA	-19 21 09	- 857	-344.05	-4.23	+14 44.2	-12.5		3 51 10.9		
20 SU	-19 35 05	- 836	-348.18	-4.13	+14 30.8	-13.3		3 55 07.5		
21 MO	-19 48 40	- 815	-352.20	-4.02	+14 16.7	-14.2		3 59 04.1		
22 TU	-20 01 54	- 793	-356.12	-3.92	+14 01.7	-15.0		4 03 00.6		
23 WE	-20 14 45	- 771	-359.93	-3.81	+13 45.9	-15.8		4 06 57.2		
24 TH	-20 27 14	- 749	-363.63	-3.70	+13 29.3	-16.6		4 10 53.7		
25 FR	-20 39 21	- 726	-367.21	-3.59	+13 11.9	-17.4		4 14 50.3		
26 SA	-20 51 04	- 703	-370.69	-3.47	+12 53.8	-18.2		4 18 46.8		
27 SU	-21 02 25	- 680	-374.05	-3.36	+12 34.9	-18.9		4 22 43.4		
28 MO	-21 13 21	- 656	-377.29	-3.24	+12 15.2	-19.7		4 26 40.0		
29 TU	-21 23 53	- 632	-380.41	-3.12	+11 54.8	-20.4		4 30 36.5		
30 WE	-21 34 02	- 608	-383.42	-3.00	+11 33.6	-21.1		4 34 33.1		
		- 584		-2.88		-21.8				

Table 2b. Sun, 1994, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS				DAILY CHANGE (SEC)			
	°	'	''	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)		MIN	SEC	HR MIN SEC
DEC 1 TH	-21	43	45	- 559	-386.30	-2.76	+11 11.8	-22.5		4 38 29.6
2 FR	-21	53	04	- 533	-389.06	-2.63	+10 49.3	-23.1		4 42 26.2
3 SA	-22	01	57	- 508	-391.69	-2.51	+10 26.2	-23.7		4 46 22.7
4 SU	-22	10	25	- 482	-394.20	-2.38	+10 02.4	-24.3		4 50 19.3
5 MO	-22	18	28	- 456	-396.58	-2.25	+09 38.1	-24.9		4 54 15.9
6 TU	-22	26	04	- 430	-398.84	-2.12	+09 13.2	-25.4		4 58 12.4
7 WE	-22	33	14	- 404	-400.96	-2.00	+08 47.8	-25.9		5 02 09.0
8 TH	-22	39	58	- 377	-402.95	-1.86	+08 21.9	-26.4		5 06 05.5
9 FR	-22	46	15	- 350	-404.81	-1.73	+07 55.6	-26.8		5 10 02.1
10 SA	-22	52	05	- 323	-406.54	-1.60	+07 28.8	-27.2		5 13 58.6
11 SU	-22	57	28	- 296	-408.14	-1.46	+07 01.6	-27.6		5 17 55.2
12 MO	-23	02	24	- 268	-409.60	-1.32	+06 34.0	-27.9		5 21 51.8
13 TU	-23	06	53	- 241	-410.93	-1.19	+06 06.1	-28.3		5 25 48.3
14 WE	-23	10	54	- 213	-412.12	-1.05	+05 37.8	-28.5		5 29 44.9
15 TH	-23	14	27	- 185	-413.17	-0.91	+05 09.3	-28.8		5 33 41.4
16 FR	-23	17	32	- 158	-414.09	-0.78	+04 40.5	-29.0		5 37 38.0
17 SA	-23	20	10	- 130	-414.86	-0.64	+04 11.4	-29.2		5 41 34.5
18 SU	-23	22	19	- 102	-415.50	-0.50	+03 42.2	-29.4		5 45 31.1
19 MO	-23	24	01	- 73	-416.00	-0.36	+03 12.7	-29.6		5 49 27.7
20 TU	-23	25	14	- 45	-416.37	-0.22	+02 43.2	-29.7		5 53 24.2
21 WE	-23	26	00	- 17	-416.59	-0.08	+02 13.5	-29.8		5 57 20.8
22 TH	-23	26	16	+ 11	-416.67	+0.05	+01 43.7	-29.8		6 01 17.3
23 FR	-23	26	05	+ 40	-416.62	+0.20	+01 13.9	-29.8		6 05 13.9
24 SA	-23	25	26	+ 68	-416.42	+0.34	+00 44.1	-29.8		6 09 10.5
25 SU	-23	24	18	+ 96	-416.09	+0.47	+00 14.3	-29.8		6 13 07.0
26 MO	-23	22	41	+ 124	-415.61	+0.61	-00 15.5	-29.7		6 17 03.6
27 TU	-23	20	37	+ 153	-415.00	+0.76	-00 45.2	-29.6		6 21 00.1
28 WE	-23	18	05	+ 181	-414.24	+0.89	-01 14.8	-29.4		6 24 56.7
29 TH	-23	15	04	+ 209	-413.35	+1.03	-01 44.2	-29.3		6 28 53.2
30 FR	-23	11	35	+ 237	-412.32	+1.17	-02 13.5	-29.0		6 32 49.8
31 SA	-23	07	39	+ 264	-411.15	+1.30	-02 42.6	-28.8		6 36 46.3
32 SU	-23	03	14		-409.85		-03 11.3			6 40 42.9

Table 2c. Sun, 1995, for zero hours universal time (GMT)

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS				DAILY CHANGE (SEC)			
	°	'	"	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)		MIN	SEC	
JAN 0 SA	-23	07	39		-411.15			-02	42.6	6 36 46.3
JAN 1 SU	-23	03	14	+ 264	-409.85	+1.30	-28.8	-03	11.3	6 40 42.9
2 MO	-22	58	23	+ 292	-408.41	+1.44	-28.5	-03	39.8	6 44 39.5
3 TU	-22	53	03	+ 319	-406.83	+1.58	-28.2	-04	08.0	6 48 36.0
4 WE	-22	47	17	+ 347	-405.12	+1.71	-27.8	-04	35.8	6 52 32.6
5 TH	-22	41	03	+ 374	-403.27	+1.85	-27.4	-05	03.2	6 56 29.2
6 FR	-22	34	22	+ 401	-401.29	+1.98	-27.0	-05	30.2	7 00 25.7
7 SA	-22	27	15	+ 427	-399.18	+2.11	-26.5	-05	56.7	7 04 22.3
8 SU	-22	19	41	+ 454	-396.94	+2.24	-26.0	-06	22.7	7 08 18.8
9 MO	-22	11	40	+ 480	-394.57	+2.37	-25.5	-06	48.1	7 12 15.4
10 TU	-22	03	14	+ 506	-392.07	+2.50	-24.9	-07	13.1	7 16 11.9
11 WE	-21	54	22	+ 532	-389.44	+2.63	-24.4	-07	37.5	7 20 08.5
12 TH	-21	45	04	+ 558	-386.69	+2.76	-23.8	-08	01.2	7 24 05.0
13 FR	-21	35	21	+ 583	-383.81	+2.88	-23.2	-08	24.4	7 28 01.6
14 SA	-21	25	13	+ 608	-380.80	+3.00	-22.5	-08	47.0	7 31 58.2
15 SU	-21	14	40	+ 633	-377.68	+3.13	-21.9	-09	08.8	7 35 54.7
16 MO	-21	03	42	+ 657	-374.43	+3.24	-21.2	-09	30.1	7 39 51.3
17 TU	-20	52	21	+ 682	-371.07	+3.37	-20.5	-09	50.6	7 43 47.8
18 WE	-20	40	36	+ 705	-367.58	+3.48	-19.9	-10	10.5	7 47 44.4
19 TH	-20	28	27	+ 729	-363.98	+3.60	-19.1	-10	29.6	7 51 40.9
20 FR	-20	15	55	+ 752	-360.27	+3.71	-18.4	-10	48.1	7 55 37.5
21 SA	-20	02	59	+ 775	-356.44	+3.83	-17.7	-11	05.8	7 59 34.0
22 SU	-19	49	42	+ 798	-352.50	+3.94	-17.0	-11	22.7	8 03 30.6
23 MO	-19	36	02	+ 820	-348.45	+4.05	-16.2	-11	38.9	8 07 27.2
24 TU	-19	22	00	+ 842	-344.30	+4.16	-15.5	-11	54.4	8 11 23.7
25 WE	-19	07	37	+ 863	-340.03	+4.26	-14.7	-12	09.1	8 15 20.3
26 TH	-18	52	52	+ 884	-335.66	+4.37	-13.9	-12	23.1	8 19 16.8
27 FR	-18	37	47	+ 905	-331.19	+4.47	-13.2	-12	36.2	8 23 13.4
28 SA	-18	22	21	+ 926	-326.62	+4.57	-12.4	-12	48.6	8 27 09.9
29 SU	-18	06	36	+ 946	-321.95	+4.67	-11.6	-13	00.2	8 31 06.5
30 MO	-17	50	31	+ 965	-317.19	+4.77	-10.8	-13	10.9	8 35 03.1
31 TU	-17	34	07	+ 984	-312.33	+4.86	-10.0	-13	20.9	8 38 59.6
				+1003		+4.95	- 9.1			

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS				DAILY CHANGE (SEC)			
	°	'	"	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)		MIN	SEC	HR MIN SEC
FEB 1 WE	-17	17	24		-307.38			-13	30.1	8 42 56.2
2 TH	-17	00	22	+1021	-302.33	+5.04	- 8.3	-13	38.4	8 46 52.7
3 FR	-16	43	03	+1039	-297.20	+5.13	- 7.5	-13	45.9	8 50 49.3
4 SA	-16	25	27	+1056	-291.99	+5.21	- 6.7	-13	52.5	8 54 45.8
5 SU	-16	07	33	+1074	-286.68	+5.30	- 5.8	-13	58.4	8 58 42.4
6 MO	-15	49	23	+1090	-281.30	+5.38	- 5.0	-14	03.4	9 02 38.9
7 TU	-15	30	57	+1106	-275.84	+5.46	- 4.2	-14	07.6	9 06 35.5
8 WE	-15	12	15	+1122	-270.29	+5.54	- 3.4	-14	11.0	9 10 32.0
9 TH	-14	53	17	+1138	-264.68	+5.62	- 2.6	-14	13.5	9 14 28.6
10 FR	-14	34	05	+1153	-258.99	+5.69	- 1.8	-14	15.3	9 18 25.2
11 SA	-14	14	38	+1167	-253.22	+5.76	- 1.0	-14	16.2	9 22 21.7
12 SU	-13	54	56	+1181	-247.39	+5.83	- 0.2	-14	16.4	9 26 18.3
13 MO	-13	35	01	+1195	-241.49	+5.90	+ 0.6	-14	15.8	9 30 14.8
14 TU	-13	14	53	+1208	-235.52	+5.97	+ 1.4	-14	14.4	9 34 11.4
15 WE	-12	54	32	+1221	-229.49	+6.03	+ 2.1	-14	12.3	9 38 07.9
16 TH	-12	33	58	+1234	-223.40	+6.09	+ 2.9	-14	09.5	9 42 04.5
17 FR	-12	13	12	+1246	-217.25	+6.15	+ 3.6	-14	05.9	9 46 01.0
18 SA	-11	52	15	+1258	-211.04	+6.21	+ 4.3	-14	01.6	9 49 57.6
19 SU	-11	31	06	+1269	-204.77	+6.27	+ 5.0	-13	56.7	9 53 54.1
20 MO	-11	09	46	+1280	-198.45	+6.32	+ 5.6	-13	51.0	9 57 50.7
21 TU	-10	48	15	+1291	-192.08	+6.38	+ 6.3	-13	44.8	10 01 47.2
22 WE	-10	26	35	+1301	-185.65	+6.42	+ 6.9	-13	37.9	10 05 43.8
23 TH	-10	04	44	+1310	-179.18	+6.47	+ 7.5	-13	30.3	10 09 40.3
24 FR	- 9	42	44	+1320	-172.66	+6.52	+ 8.1	-13	22.2	10 13 36.9
25 SA	- 9	20	36	+1329	-166.10	+6.56	+ 8.7	-13	13.5	10 17 33.5
26 SU	- 8	58	18	+1337	-159.50	+6.60	+ 9.3	-13	04.2	10 21 30.0
27 MO	- 8	35	53	+1345	-152.85	+6.64	+ 9.8	-12	54.4	10 25 26.6
28 TU	- 8	13	20	+1353	-146.17	+6.68	+10.4	-12	44.0	10 29 23.1
				+1360		+6.72	+10.9			

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS						
	°	' "	DAILY CHANGE (SEC)	DAILY CHANGE (MILS)	MIN	SEC	DAILY CHANGE (SEC)	HR	MIN SEC
MAR 1 WE	- 7	50 40	+1367	-139.46	+6.75	-12 33.1	+11.4	10	33 19.7
2 TH	- 7	27 53	+1373	-132.71	+6.78	-12 21.6	+11.9	10	37 16.2
3 FR	- 7	05 00	+1379	-125.92	+6.81	-12 09.7	+12.4	10	41 12.8
4 SA	- 6	42 00	+1385	-119.11	+6.84	-11 57.2	+12.9	10	45 09.3
5 SU	- 6	18 56	+1390	-112.27	+6.86	-11 44.3	+13.4	10	49 05.9
6 MO	- 5	55 45	+1395	-105.41	+6.89	-11 31.0	+13.8	10	53 02.4
7 TU	- 5	32 31	+1399	- 98.52	+6.91	-11 17.2	+14.2	10	56 59.0
8 WE	- 5	09 11	+1403	- 91.61	+6.93	-11 03.0	+14.6	11	00 55.5
9 TH	- 4	45 48	+1407	- 84.68	+6.95	-10 48.3	+15.0	11	04 52.1
10 FR	- 4	22 21	+1410	- 77.73	+6.96	-10 33.3	+15.4	11	08 48.6
11 SA	- 3	58 51	+1413	- 70.77	+6.98	-10 17.9	+15.7	11	12 45.2
12 SU	- 3	35 18	+1415	- 63.79	+6.99	-10 02.2	+16.0	11	16 41.7
13 MO	- 3	11 43	+1418	- 56.80	+7.00	-09 46.2	+16.3	11	20 38.3
14 TU	- 2	48 05	+1419	- 49.80	+7.01	-09 29.8	+16.6	11	24 34.9
15 WE	- 2	24 26	+1421	- 42.79	+7.02	-09 13.2	+16.9	11	28 31.4
16 TH	- 2	00 45	+1422	- 35.78	+7.02	-08 56.3	+17.1	11	32 28.0
17 FR	- 1	37 03	+1422	- 28.76	+7.02	-08 39.2	+17.3	11	36 24.5
18 SA	- 1	13 21	+1423	- 21.73	+7.03	-08 21.9	+17.5	11	40 21.0
19 SU	- 0	49 38	+1423	- 14.71	+7.03	-08 04.3	+17.7	11	44 17.6
20 MO	- 0	25 55	+1423	- 7.68	+7.03	-07 46.7	+17.8	11	48 14.1
21 TU	- 0	02 12	+1422	- 0.65	+7.02	-07 28.9	+17.9	11	52 10.7
22 WE	+ 0	21 29	+1421	+ 6.37	+7.02	-07 11.0	+18.0	11	56 07.3
23 TH	+ 0	45 10	+1420	+ 13.38	+7.01	-06 53.0	+18.1	12	00 03.8
24 FR	+ 1	08 50	+1418	+ 20.39	+7.00	-06 34.9	+18.1	12	04 00.4
25 SA	+ 1	32 28	+1416	+ 27.40	+6.99	-06 16.8	+18.1	12	07 56.9
26 SU	+ 1	56 03	+1413	+ 34.39	+6.98	-05 58.7	+18.1	12	11 53.5
27 MO	+ 2	19 36	+1410	+ 41.37	+6.96	-05 40.6	+18.1	12	15 50.0
28 TU	+ 2	43 07	+1407	+ 48.33	+6.95	-05 22.4	+18.1	12	19 46.6
29 WE	+ 3	06 34	+1403	+ 55.28	+6.93	-05 04.3	+18.1	12	23 43.1
30 TH	+ 3	29 57	+1399	+ 62.21	+6.91	-04 46.3	+18.0	12	27 39.7
31 FR	+ 3	53 17	+1395	+ 69.12	+6.89	-04 28.3	+17.9	12	31 36.2

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "	DAILY CHANGE (SEC)	MILS						
APR 1 SA	+ 4	16 32		+ 76.01	-04	10.4		12	35	32.8
2 SU	+ 4	39 42	+1390	+ 82.87	+6.86	-03	52.6	+17.8	12	39 29.3
3 MO	+ 5	02 47	+1385	+ 89.72	+6.84	-03	34.9	+17.7	12	43 25.9
4 TU	+ 5	25 47	+1380	+ 96.53	+6.81	-03	17.3	+17.6	12	47 22.4
5 WE	+ 5	48 41	+1374	+103.32	+6.79	-02	59.8	+17.4	12	51 19.0
6 TH	+ 6	11 29	+1368	+110.07	+6.76	-02	42.5	+17.3	12	55 15.5
7 FR	+ 6	34 11	+1362	+116.80	+6.73	-02	25.4	+17.1	12	59 12.1
8 SA	+ 6	56 46	+1355	+123.49	+6.69	-02	08.5	+16.9	13	03 08.6
9 SU	+ 7	19 13	+1348	+130.14	+6.66	-01	51.8	+16.7	13	07 05.2
10 MO	+ 7	41 33	+1340	+136.76	+6.62	-01	35.3	+16.5	13	11 01.8
11 TU	+ 8	03 45	+1332	+143.34	+6.58	-01	19.0	+16.3	13	14 58.3
12 WE	+ 8	25 49	+1324	+149.87	+6.54	-01	03.0	+16.0	13	18 54.9
13 TH	+ 8	47 45	+1315	+156.37	+6.49	-00	47.3	+15.7	13	22 51.4
14 FR	+ 9	09 31	+1307	+162.82	+6.45	-00	31.9	+15.4	13	26 47.9
15 SA	+ 9	31 09	+1297	+169.23	+6.40	-00	16.8	+15.1	13	30 44.5
16 SU	+ 9	52 37	+1288	+175.59	+6.36	-00	02.0	+14.8	13	34 41.0
17 MO	+10	13 55	+1278	+181.90	+6.31	+00	12.4	+14.4	13	38 37.6
18 TU	+10	35 03	+1268	+188.16	+6.26	+00	26.4	+14.0	13	42 34.2
19 WE	+10	56 01	+1258	+194.37	+6.21	+00	40.0	+13.6	13	46 30.7
20 TH	+11	16 48	+1247	+200.53	+6.16	+00	53.2	+13.2	13	50 27.3
21 FR	+11	37 24	+1236	+206.64	+6.10	+01	06.0	+12.8	13	54 23.8
22 SA	+11	57 48	+1225	+212.68	+6.05	+01	18.3	+12.3	13	58 20.4
23 SU	+12	18 01	+1213	+218.67	+5.99	+01	30.2	+11.9	14	02 16.9
24 MO	+12	38 02	+1201	+224.60	+5.93	+01	41.5	+11.4	14	06 13.5
25 TU	+12	57 50	+1188	+230.47	+5.87	+01	52.5	+10.9	14	10 10.1
26 WE	+13	17 26	+1176	+236.28	+5.81	+02	02.9	+10.4	14	14 06.6
27 TH	+13	36 48	+1162	+242.02	+5.74	+02	12.8	+ 9.9	14	18 03.1
28 FR	+13	55 57	+1149	+247.69	+5.67	+02	22.2	+ 9.4	14	21 59.7
29 SA	+14	14 53	+1135	+253.30	+5.60	+02	31.1	+ 8.9	14	25 56.2
30 SU	+14	33 34	+1121	+258.83	+5.54	+02	39.5	+ 8.4	14	29 52.8
			+1107		+5.47			+ 7.9		

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
MAY 1 MO	+14 52 00		+264.30		+02 47.3			14	33	49.4
2 TU	+15 10 13	+1092	+269.69	+5.39	+02 54.7	+ 7.3		14	37	45.9
3 WE	+15 28 09	+1077	+275.01	+5.32	+03 01.5	+ 6.8		14	41	42.5
4 TH	+15 45 51	+1062	+280.25	+5.24	+03 07.7	+ 6.3		14	45	39.0
5 FR	+16 03 17	+1046	+285.42	+5.17	+03 13.5	+ 5.7		14	49	35.6
6 SA	+16 20 27	+1030	+290.50	+5.09	+03 18.6	+ 5.2		14	53	32.1
7 SU	+16 37 20	+1014	+295.51	+5.01	+03 23.3	+ 4.6		14	57	28.7
8 MO	+16 53 57	+ 997	+300.43	+4.92	+03 27.4	+ 4.1		15	01	25.3
9 TU	+17 10 17	+ 980	+305.27	+4.84	+03 30.9	+ 3.5		15	05	21.8
10 WE	+17 26 20	+ 963	+310.02	+4.76	+03 33.9	+ 3.0		15	09	18.4
11 TH	+17 42 05	+ 945	+314.69	+4.67	+03 36.3	+ 2.4		15	13	14.9
12 FR	+17 57 32	+ 927	+319.27	+4.58	+03 38.2	+ 1.9		15	17	11.5
13 SA	+18 12 41	+ 909	+323.76	+4.49	+03 39.6	+ 1.3		15	21	08.0
14 SU	+18 27 32	+ 891	+328.16	+4.40	+03 40.3	+ 0.8		15	25	04.6
15 MO	+18 42 04	+ 872	+332.46	+4.31	+03 40.5	+ 0.2		15	29	01.1
16 TU	+18 56 17	+ 853	+336.68	+4.21	+03 40.1	- 0.4		15	32	57.7
17 WE	+19 10 11	+ 834	+340.80	+4.12	+03 39.2	- 0.9		15	36	54.2
18 TH	+19 23 46	+ 815	+344.82	+4.02	+03 37.7	- 1.5		15	40	50.8
19 FR	+19 37 00	+ 795	+348.74	+3.93	+03 35.6	- 2.1		15	44	47.4
20 SA	+19 49 55	+ 775	+352.57	+3.83	+03 32.9	- 2.7		15	48	43.9
21 SU	+20 02 30	+ 755	+356.30	+3.73	+03 29.7	- 3.2		15	52	40.5
22 MO	+20 14 44	+ 734	+359.92	+3.62	+03 25.9	- 3.8		15	56	37.0
23 TU	+20 26 37	+ 713	+363.44	+3.52	+03 21.6	- 4.3		16	00	33.6
24 WE	+20 38 10	+ 692	+366.86	+3.42	+03 16.7	- 4.9		16	04	30.1
25 TH	+20 49 21	+ 671	+370.18	+3.31	+03 11.3	- 5.4		16	08	26.7
26 FR	+21 00 10	+ 650	+373.38	+3.21	+03 05.4	- 5.9		16	12	23.2
27 SA	+21 10 38	+ 628	+376.48	+3.10	+02 59.0	- 6.4		16	16	19.8
28 SU	+21 20 44	+ 606	+379.48	+2.99	+02 52.1	- 6.9		16	20	16.3
29 MO	+21 30 28	+ 584	+382.36	+2.88	+02 44.7	- 7.4		16	24	12.9
30 TU	+21 39 49	+ 561	+385.13	+2.77	+02 36.8	- 7.8		16	28	09.5
31 WE	+21 48 48	+ 539	+387.79	+2.66	+02 28.6	- 8.3		16	32	06.0
		+ 516		+2.55		- 8.7				

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS						
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)	MIN	SEC	DAILY CHANGE (SEC)	HR	MIN SEC
JUN 1 TH	+21 57 24	+ 493	+390.34	+2.43	+02	19.9	- 9.1	16	36 02.6
2 FR	+22 05 38	+ 470	+392.78	+2.32	+02	10.8	- 9.5	16	39 59.1
3 SA	+22 13 28	+ 447	+395.10	+2.21	+02	01.3	- 9.8	16	43 55.7
4 SU	+22 20 55	+ 423	+397.31	+2.09	+01	51.5	-10.2	16	47 52.3
5 MO	+22 27 58	+ 400	+399.40	+1.98	+01	41.3	-10.5	16	51 48.8
6 TU	+22 34 38	+ 376	+401.37	+1.86	+01	30.8	-10.8	16	55 45.4
7 WE	+22 40 54	+ 352	+403.23	+1.74	+01	20.0	-11.1	16	59 41.9
8 TH	+22 46 46	+ 328	+404.97	+1.62	+01	08.9	-11.3	17	03 38.5
9 FR	+22 52 14	+ 304	+406.59	+1.50	+00	57.6	-11.6	17	07 35.0
10 SA	+22 57 18	+ 280	+408.09	+1.38	+00	46.0	-11.8	17	11 31.6
11 SU	+23 01 58	+ 255	+409.47	+1.26	+00	34.2	-12.0	17	15 28.1
12 MO	+23 06 13	+ 231	+410.73	+1.14	+00	22.2	-12.2	17	19 24.7
13 TU	+23 10 04	+ 207	+411.87	+1.02	+00	10.0	-12.4	17	23 21.3
14 WE	+23 13 31	+ 182	+412.89	+0.90	-00	02.4	-12.5	17	27 17.8
15 TH	+23 16 33	+ 157	+413.79	+0.78	-00	14.9	-12.7	17	31 14.4
16 FR	+23 19 10	+ 133	+414.57	+0.66	-00	27.6	-12.8	17	35 10.9
17 SA	+23 21 23	+ 108	+415.23	+0.53	-00	40.4	-12.9	17	39 07.5
18 SU	+23 23 11	+ 83	+415.76	+0.41	-00	53.3	-13.0	17	43 04.1
19 MO	+23 24 34	+ 58	+416.17	+0.29	-01	06.2	-13.0	17	47 00.6
20 TU	+23 25 33	+ 34	+416.46	+0.17	-01	19.2	-13.1	17	50 57.2
21 WE	+23 26 06	+ 9	+416.62	+0.04	-01	32.3	-13.1	17	54 53.7
22 TH	+23 26 15	- 16	+416.67	-0.08	-01	45.4	-13.1	17	58 50.3
23 FR	+23 25 59	- 41	+416.59	-0.20	-01	58.4	-13.0	18	02 46.8
24 SA	+23 25 18	- 66	+416.38	-0.33	-02	11.4	-12.9	18	06 43.4
25 SU	+23 24 12	- 90	+416.06	-0.44	-02	24.4	-12.8	18	10 39.9
26 MO	+23 22 42	- 115	+415.61	-0.57	-02	37.2	-12.7	18	14 36.5
27 TU	+23 20 47	- 140	+415.05	-0.69	-02	49.9	-12.6	18	18 33.1
28 WE	+23 18 27	- 164	+414.36	-0.81	-03	02.5	-12.4	18	22 29.6
29 TH	+23 15 43	- 189	+413.55	-0.93	-03	14.9	-12.2	18	26 26.2
30 FR	+23 12 34	- 213	+412.61	-1.05	-03	27.1	-12.0	18	30 22.7

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
JUL 1 SA	+23 09 01		+411.56		-03 39.1			18	34	19.3
2 SU	+23 05 04	- 237	+410.39	-1.17	-03 50.8	-11.7		18	38	15.8
3 MO	+23 00 42	- 261	+409.10	-1.29	-04 02.2	-11.4		18	42	12.4
4 TU	+22 55 57	- 286	+407.69	-1.41	-04 13.4	-11.1		18	46	09.0
5 WE	+22 50 47	- 310	+406.16	-1.53	-04 24.2	-10.8		18	50	05.5
6 TH	+22 45 14	- 333	+404.51	-1.64	-04 34.6	-10.5		18	54	02.1
7 FR	+22 39 17	- 357	+402.75	-1.76	-04 44.7	-10.1		18	57	58.6
8 SA	+22 32 56	- 381	+400.87	-1.88	-04 54.5	- 9.7		19	01	55.2
9 SU	+22 26 13	- 404	+398.88	-2.00	-05 03.8	- 9.3		19	05	51.7
10 MO	+22 19 05	- 427	+396.77	-2.11	-05 12.7	- 8.9		19	09	48.3
11 TU	+22 11 35	- 450	+394.54	-2.22	-05 21.1	- 8.5		19	13	44.9
12 WE	+22 03 42	- 473	+392.21	-2.34	-05 29.2	- 8.0		19	17	41.4
13 TH	+21 55 26	- 496	+389.76	-2.45	-05 36.7	- 7.6		19	21	38.0
14 FR	+21 46 48	- 518	+387.20	-2.56	-05 43.8	- 7.1		19	25	34.5
15 SA	+21 37 47	- 541	+384.53	-2.67	-05 50.5	- 6.6		19	29	31.1
16 SU	+21 28 25	- 563	+381.75	-2.78	-05 56.6	- 6.2		19	33	27.6
17 MO	+21 18 40	- 585	+378.86	-2.89	-06 02.3	- 5.7		19	37	24.2
18 TU	+21 08 33	- 607	+375.87	-3.00	-06 07.4	- 5.2		19	41	20.7
19 WE	+20 58 05	- 628	+372.77	-3.10	-06 12.1	- 4.6		19	45	17.3
20 TH	+20 47 16	- 649	+369.56	-3.20	-06 16.2	- 4.1		19	49	13.9
21 FR	+20 36 05	- 671	+366.25	-3.31	-06 19.8	- 3.6		19	53	10.4
22 SA	+20 24 34	- 691	+362.83	-3.41	-06 22.9	- 3.1		19	57	07.0
23 SU	+20 12 42	- 712	+359.32	-3.52	-06 25.4	- 2.5		20	01	03.5
24 MO	+20 00 30	- 732	+355.70	-3.61	-06 27.3	- 1.9		20	05	00.1
25 TU	+19 47 57	- 752	+351.99	-3.71	-06 28.7	- 1.4		20	08	56.6
26 WE	+19 35 05	- 772	+348.17	-3.81	-06 29.4	- 0.8		20	12	53.2
27 TH	+19 21 54	- 791	+344.27	-3.91	-06 29.6	- 0.2		20	16	49.8
28 FR	+19 08 23	- 811	+340.26	-4.00	-06 29.2	+ 0.4		20	20	46.3
29 SA	+18 54 34	- 830	+336.17	-4.10	-06 28.2	+ 1.0		20	24	42.9
30 SU	+18 40 25	- 848	+331.98	-4.19	-06 26.6	+ 1.6		20	28	39.4
31 MO	+18 25 59	- 867	+327.70	-4.28	-06 24.4	+ 2.2		20	32	36.0
		- 885		-4.37		+ 2.8				

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		DAILY CHANGE (SEC)	MILS		DAILY CHANGE (SEC)		HR	MIN	SEC
	°	' "		MILS	DAILY CHANGE (MILS)					
AUG 1 TU	+18	11 14	- 902	+323.33	-4.45	-06 21.6	+ 3.5	20	36	32.5
2 WE	+17	56 12	- 920	+318.87	-4.54	-06 18.1	+ 4.1	20	40	29.1
3 TH	+17	40 52	- 937	+314.33	-4.63	-06 14.0	+ 4.7	20	44	25.6
4 FR	+17	25 15	- 954	+309.70	-4.71	-06 09.3	+ 5.3	20	48	22.2
5 SA	+17	09 21	- 971	+304.99	-4.80	-06 04.0	+ 6.0	20	52	18.7
6 SU	+16	53 10	- 987	+300.20	-4.87	-05 58.0	+ 6.6	20	56	15.3
7 MO	+16	36 43	-1003	+295.32	-4.95	-05 51.4	+ 7.2	21	00	11.9
8 TU	+16	20 00	-1019	+290.37	-5.03	-05 44.2	+ 7.8	21	04	08.4
9 WE	+16	03 01	-1034	+285.34	-5.11	-05 36.4	+ 8.4	21	08	05.0
10 TH	+15	45 47	-1049	+280.23	-5.18	-05 28.0	+ 9.0	21	12	01.5
11 FR	+15	28 18	-1064	+275.05	-5.25	-05 19.1	+ 9.5	21	15	58.1
12 SA	+15	10 34	-1079	+269.80	-5.33	-05 09.5	+10.1	21	19	54.6
13 SU	+14	52 36	-1093	+264.47	-5.40	-04 59.4	+10.6	21	23	51.2
14 MO	+14	34 23	-1107	+259.08	-5.47	-04 48.8	+11.2	21	27	47.7
15 TU	+14	15 56	-1121	+253.61	-5.54	-04 37.6	+11.7	21	31	44.3
16 WE	+13	57 15	-1134	+248.08	-5.60	-04 25.9	+12.2	21	35	40.8
17 TH	+13	38 21	-1147	+242.48	-5.66	-04 13.7	+12.7	21	39	37.4
18 FR	+13	19 14	-1160	+236.81	-5.73	-04 01.0	+13.2	21	43	33.9
19 SA	+12	59 55	-1172	+231.08	-5.79	-03 47.8	+13.7	21	47	30.5
20 SU	+12	40 22	-1184	+225.30	-5.85	-03 34.1	+14.1	21	51	27.1
21 MO	+12	20 38	-1196	+219.45	-5.91	-03 20.0	+14.6	21	55	23.6
22 TU	+12	00 42	-1207	+213.54	-5.96	-03 05.4	+15.1	21	59	20.2
23 WE	+11	40 35	-1219	+207.58	-6.02	-02 50.3	+15.5	22	03	16.7
24 TH	+11	20 16	-1229	+201.56	-6.07	-02 34.8	+15.9	22	07	13.3
25 FR	+10	59 47	-1240	+195.49	-6.12	-02 18.9	+16.3	22	11	09.8
26 SA	+10	39 07	-1250	+189.37	-6.17	-02 02.6	+16.7	22	15	06.4
27 SU	+10	18 17	-1260	+183.19	-6.22	-01 45.8	+17.1	22	19	02.9
28 MO	+ 9	57 17	-1269	+176.97	-6.27	-01 28.7	+17.5	22	22	59.5
29 TU	+ 9	36 08	-1278	+170.71	-6.31	-01 11.2	+17.9	22	26	56.0
30 WE	+ 9	14 50	-1287	+164.39	-6.36	-00 53.3	+18.2	22	30	52.6
31 TH	+ 8	53 23	-1295	+158.04	-6.40	-00 35.1	+18.6	22	34	49.1

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS						
	°	' "	DAILY CHANGE (SEC)	DAILY CHANGE (MILS)	MIN	SEC	DAILY CHANGE (SEC)	HR	MIN SEC
SEP 1 FR	+ 8	31 47		+151.64	-00	16.5		22	38 45.7
2 SA	+ 8	10 04	-1304	+145.20	+00	02.4	+18.9	22	42 42.2
3 SU	+ 7	48 12	-1311	+138.73	+00	21.6	+19.2	22	46 38.8
4 MO	+ 7	26 13	-1319	+132.21	+00	41.1	+19.5	22	50 35.3
5 TU	+ 7	04 07	-1326	+125.67	+01	00.9	+19.8	22	54 31.9
6 WE	+ 6	41 55	-1333	+119.08	+01	20.9	+20.0	22	58 28.5
7 TH	+ 6	19 35	-1339	+112.47	+01	41.2	+20.3	23	02 25.0
8 FR	+ 5	57 10	-1346	+105.83	+02	01.7	+20.5	23	06 21.6
9 SA	+ 5	34 38	-1351	+ 99.15	+02	22.4	+20.7	23	10 18.1
10 SU	+ 5	12 01	-1357	+ 92.45	+02	43.2	+20.9	23	14 14.7
11 MO	+ 4	49 19	-1362	+ 85.72	+03	04.2	+21.0	23	18 11.2
12 TU	+ 4	26 32	-1367	+ 78.97	+03	25.3	+21.1	23	22 07.8
13 WE	+ 4	03 40	-1372	+ 72.20	+03	46.5	+21.2	23	26 04.3
14 TH	+ 3	40 43	-1376	+ 65.40	+04	07.8	+21.3	23	30 00.9
15 FR	+ 3	17 43	-1381	+ 58.58	+04	29.2	+21.4	23	33 57.4
16 SA	+ 2	54 38	-1384	+ 51.74	+04	50.6	+21.4	23	37 54.0
17 SU	+ 2	31 31	-1388	+ 44.89	+05	12.0	+21.4	23	41 50.5
18 MO	+ 2	08 20	-1391	+ 38.02	+05	33.4	+21.4	23	45 47.1
19 TU	+ 1	45 07	-1393	+ 31.14	+05	54.7	+21.4	23	49 43.6
20 WE	+ 1	21 51	-1396	+ 24.25	+06	16.1	+21.3	23	53 40.2
21 TH	+ 0	58 33	-1398	+ 17.35	+06	37.3	+21.3	23	57 36.7
22 FR	+ 0	35 14	-1399	+ 10.44	+06	58.5	+21.2	0	01 33.3
23 SA	+ 0	11 53	-1401	+ 3.52	+07	19.6	+21.1	0	05 29.8
24 SU	- 0	11 29	-1402	- 3.40	+07	40.5	+21.0	0	09 26.4
25 MO	- 0	34 51	-1402	- 10.33	+08	01.4	+20.8	0	13 22.9
26 TU	- 0	58 14	-1403	- 17.25	+08	22.0	+20.7	0	17 19.5
27 WE	- 1	21 37	-1403	- 24.18	+08	42.6	+20.5	0	21 16.0
28 TH	- 1	44 59	-1402	- 31.10	+09	02.9	+20.3	0	25 12.6
29 FR	- 2	08 20	-1401	- 38.02	+09	23.0	+20.1	0	29 09.1
30 SA	- 2	31 40	-1400	- 44.94	+09	42.9	+19.9	0	33 05.7
			-1399	-6.91			+19.7		

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS				DAILY CHANGE (SEC)			
	°	'	"	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)		MIN	SEC	HR MIN SEC
OCT 1 SU	- 2	54	59	-1397	- 51.84	-6.90	+10 02.6	+19.4		0 37 02.2
2 MO	- 3	18	15	-1394	- 58.74	-6.88	+10 22.0	+19.1		0 40 58.8
3 TU	- 3	41	30	-1392	- 65.63	-6.87	+10 41.2	+18.9		0 44 55.4
4 WE	- 4	04	41	-1389	- 72.50	-6.86	+11 00.0	+18.5		0 48 51.9
5 TH	- 4	27	50	-1385	- 79.36	-6.84	+11 18.6	+18.2		0 52 48.5
6 FR	- 4	50	56	-1382	- 86.20	-6.82	+11 36.8	+17.8		0 56 45.0
7 SA	- 5	13	58	-1378	- 93.02	-6.80	+11 54.6	+17.4		1 00 41.6
8 SU	- 5	36	55	-1374	- 99.83	-6.79	+12 12.0	+17.0		1 04 38.1
9 MO	- 5	59	49	-1369	-106.61	-6.76	+12 29.1	+16.6		1 08 34.7
10 TU	- 6	22	38	-1364	-113.37	-6.74	+12 45.7	+16.1		1 12 31.2
11 WE	- 6	45	22	-1359	-120.11	-6.71	+13 01.8	+15.7		1 16 27.8
12 TH	- 7	08	00	-1353	-126.82	-6.68	+13 17.5	+15.2		1 20 24.3
13 FR	- 7	30	33	-1347	-133.50	-6.65	+13 32.6	+14.6		1 24 20.9
14 SA	- 7	53	00	-1340	-140.15	-6.62	+13 47.2	+14.1		1 28 17.4
15 SU	- 8	15	20	-1333	-146.76	-6.58	+14 01.3	+13.5		1 32 14.0
16 MO	- 8	37	33	-1326	-153.35	-6.55	+14 14.9	+12.9		1 36 10.5
17 TU	- 8	59	39	-1318	-159.90	-6.51	+14 27.8	+12.3		1 40 07.1
18 WE	- 9	21	38	-1310	-166.41	-6.47	+14 40.2	+11.7		1 44 03.6
19 TH	- 9	43	28	-1302	-172.88	-6.43	+14 51.9	+11.1		1 48 00.2
20 FR	-10	05	10	-1293	-179.31	-6.39	+15 03.0	+10.5		1 51 56.7
21 SA	-10	26	44	-1284	-185.70	-6.34	+15 13.4	+ 9.8		1 55 53.3
22 SU	-10	48	08	-1274	-192.04	-6.29	+15 23.2	+ 9.1		1 59 49.8
23 MO	-11	09	22	-1264	-198.33	-6.24	+15 32.4	+ 8.4		2 03 46.4
24 TU	-11	30	26	-1254	-204.57	-6.19	+15 40.8	+ 7.7		2 07 42.9
25 WE	-11	51	20	-1243	-210.77	-6.14	+15 48.5	+ 7.0		2 11 39.5
26 TH	-12	12	04	-1232	-216.91	-6.08	+15 55.5	+ 6.3		2 15 36.0
27 FR	-12	32	35	-1220	-222.99	-6.02	+16 01.9	+ 5.6		2 19 32.6
28 SA	-12	52	56	-1208	-229.02	-5.97	+16 07.5	+ 4.9		2 23 29.2
29 SU	-13	13	04	-1196	-234.98	-5.91	+16 12.3	+ 4.1		2 27 25.7
30 MO	-13	33	00	-1183	-240.89	-5.84	+16 16.4	+ 3.4		2 31 22.3
31 TU	-13	52	42	-1169	-246.73	-5.77	+16 19.8	+ 2.6		2 35 18.8

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
NOV 1 WE	-14 12 12		-252.50		+16	22.4		2	39	15.4
2 TH	-14 31 28	-1156	-258.21	-5.71	+16	24.3	+ 1.8	2	43	11.9
3 FR	-14 50 29	-1142	-263.85	-5.64	+16	25.3	+ 1.1	2	47	08.5
4 SA	-15 09 16	-1127	-269.41	-5.57	+16	25.6	+ 0.3	2	51	05.0
5 SU	-15 27 49	-1112	-274.91	-5.49	+16	25.1	- 0.5	2	55	01.6
6 MO	-15 46 05	-1097	-280.32	-5.42	+16	23.7	- 1.4	2	58	58.1
7 TU	-16 04 07	-1081	-285.66	-5.34	+16	21.5	- 2.2	3	02	54.7
8 WE	-16 21 52	-1065	-290.92	-5.26	+16	18.5	- 3.0	3	06	51.2
9 TH	-16 39 21	-1049	-296.10	-5.18	+16	14.6	- 3.9	3	10	47.8
10 FR	-16 56 33	-1032	-301.20	-5.10	+16	09.9	- 4.7	3	14	44.4
11 SA	-17 13 27	-1015	-306.21	-5.01	+16	04.4	- 5.6	3	18	40.9
12 SU	-17 30 04	- 997	-311.13	-4.92	+15	57.9	- 6.4	3	22	37.5
13 MO	-17 46 23	- 979	-315.97	-4.83	+15	50.6	- 7.3	3	26	34.0
14 TU	-18 02 24	- 961	-320.71	-4.75	+15	42.5	- 8.2	3	30	30.6
15 WE	-18 18 05	- 942	-325.36	-4.65	+15	33.5	- 9.0	3	34	27.1
16 TH	-18 33 28	- 922	-329.92	-4.55	+15	23.6	- 9.9	3	38	23.7
17 FR	-18 48 31	- 903	-334.37	-4.46	+15	12.8	-10.8	3	42	20.3
18 SA	-19 03 14	- 883	-338.73	-4.36	+15	01.2	-11.6	3	46	16.8
19 SU	-19 17 36	- 862	-342.99	-4.26	+15	01.2	-12.5	3	46	16.8
20 MO	-19 31 38	- 842	-347.15	-4.16	+14	48.8	-13.3	3	50	13.4
21 TU	-19 45 18	- 821	-351.20	-4.05	+14	35.5	-14.1	3	54	09.9
22 WE	-19 58 37	- 799	-355.15	-3.95	+14	21.3	-15.0	3	58	06.5
23 TH	-20 11 35	- 777	-355.15	-3.84	+14	06.4	-15.8	4	02	03.0
24 FR	-20 24 10	- 755	-358.99	-3.73	+13	50.6	-16.6	4	05	59.6
25 SA	-20 36 22	- 732	-362.71	-3.61	+13	34.0	-17.3	4	09	56.1
26 SU	-20 48 11	- 709	-366.33	-3.50	+13	16.7	-18.1	4	13	52.7
27 MO	-20 59 37	- 686	-369.83	-3.39	+12	58.6	-18.8	4	17	49.3
28 TU	-21 10 40	- 662	-373.22	-3.27	+12	39.8	-19.5	4	21	45.8
29 WE	-21 21 18	- 639	-376.49	-3.16	+12	20.3	-20.2	4	25	42.4
30 TH	-21 31 33	- 614	-379.65	-3.03	+12	00.1	-20.9	4	29	38.9
		- 590	-382.68	-2.91	+11	39.2	-20.9	4	33	35.5
							-21.6			

Table 2c. Sun, 1995, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME			
	DEGREES		DAILY CHANGE (SEC)	MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "		MILS	DAILY CHANGE (MILS)						
DEC 1 FR	-21	41 22		-385.59		+11	17.7		4	37	32.0
2 SA	-21	50 47	- 565	-388.38	-2.79	+10	55.5	-22.2	4	41	28.6
3 SU	-21	59 47	- 540	-391.05	-2.67	+10	32.7	-22.8	4	45	25.1
4 MO	-22	08 21	- 514	-393.59	-2.54	+10	09.2	-23.4	4	49	21.7
5 TU	-22	16 30	- 489	-396.00	-2.41	+09	45.2	-24.0	4	53	18.3
6 WE	-22	24 12	- 463	-398.28	-2.29	+09	20.7	-24.6	4	57	14.8
7 TH	-22	31 29	- 437	-400.44	-2.16	+08	55.5	-25.1	5	01	11.4
8 FR	-22	38 19	- 410	-402.46	-2.02	+08	29.9	-25.6	5	05	07.9
9 SA	-22	44 42	- 384	-404.36	-1.90	+08	03.8	-26.1	5	09	04.5
10 SU	-22	50 39	- 357	-406.12	-1.76	+08	03.8	-26.6	5	09	04.5
11 MO	-22	56 09	- 330	-406.12	-1.63	+07	37.2	-27.0	5	13	01.1
12 TU	-22	56 09	- 303	-407.75	-1.50	+07	10.2	-27.5	5	16	57.6
13 WE	-23	01 12	- 275	-409.24	-1.36	+06	42.7	-27.9	5	20	54.2
14 TH	-23	05 47	- 248	-410.60	-1.22	+06	14.8	-28.2	5	24	50.7
15 FR	-23	09 54	- 220	-411.82	-1.09	+05	46.6	-28.5	5	28	47.3
16 SA	-23	13 35	- 192	-412.91	-0.95	+05	18.1	-28.8	5	32	43.8
17 SU	-23	16 47	- 164	-413.86	-0.81	+04	49.2	-29.1	5	36	40.4
18 MO	-23	19 31	- 136	-414.67	-0.67	+04	20.1	-29.4	5	40	36.9
19 TU	-23	21 48	- 108	-415.35	-0.53	+03	50.8	-29.6	5	44	33.5
20 WE	-23	23 36	- 80	-415.88	-0.40	+03	21.2	-29.7	5	48	30.1
21 TH	-23	24 56	- 52	-416.28	-0.26	+02	51.5	-29.9	5	52	26.6
22 FR	-23	25 48	- 24	-416.53	-0.12	+02	21.6	-29.9	5	56	23.2
23 SA	-23	26 12	+ 4	-416.65	+0.02	+01	51.7	-30.0	6	00	19.7
24 SU	-23	26 07	+ 33	-416.63	+0.16	+01	21.7	-30.0	6	04	16.3
25 MO	-23	25 35	+ 61	-416.47	+0.30	+00	51.7	-30.0	6	08	12.9
26 TU	-23	24 34	+ 89	-416.17	+0.44	+00	21.8	-29.9	6	12	09.4
27 WE	-23	23 05	+ 117	-415.73	+0.58	-00	08.1	-29.8	6	16	06.0
28 TH	-23	21 08	+ 145	-415.15	+0.72	-00	37.9	-29.6	6	20	02.5
29 FR	-23	18 42	+ 173	-414.43	+0.85	-01	07.5	-29.4	6	23	59.1
30 SA	-23	15 49	+ 201	-413.57	+0.99	-01	37.0	-29.2	6	27	55.6
31 SU	-23	12 27	+ 229	-412.58	+1.13	-02	06.2	-29.0	6	31	52.2
32 MO	-23	08 38	+ 257	-411.45	+1.27	-02	35.2	-28.7	6	35	48.8
	-23	04 21		-410.18		-03	03.9		6	39	45.3

Table 2d. Sun, 1996, for zero hours universal time (GMT)

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME			
	DEGREES		DAILY CHANGE (SEC)	MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "		MILS	DAILY CHANGE (MILS)						
JAN 0 SU	-23	08 38		-411.45		-02	35.2		6	35	48.8
JAN 1 MO	-23	04 21	+ 257	-410.18	+1.27	-03	03.9	-28.7	6	39	45.3
2 TU	-22	59 36	+ 285	-408.77	+1.41	-03	32.3	-28.4	6	43	41.9
3 WE	-22	54 24	+ 312	-407.23	+1.54	-04	00.4	-28.1	6	47	38.4
4 TH	-22	48 44	+ 340	-405.55	+1.68	-04	28.2	-27.7	6	51	35.0
5 FR	-22	42 37	+ 367	-403.74	+1.81	-04	55.5	-27.3	6	55	31.5
6 SA	-22	36 03	+ 394	-401.79	+1.95	-05	22.4	-26.9	6	59	28.1
7 SU	-22	29 03	+ 421	-399.72	+2.08	-05	48.9	-26.5	7	03	24.7
8 MO	-22	21 35	+ 447	-397.51	+2.21	-06	14.9	-26.0	7	07	21.2
9 TU	-22	13 42	+ 474	-395.17	+2.34	-06	40.4	-25.5	7	11	17.8
10 WE	-22	05 22	+ 500	-392.70	+2.47	-07	05.5	-25.0	7	15	14.3
11 TH	-21	56 36	+ 526	-390.10	+2.60	-07	30.0	-24.5	7	19	10.9
12 FR	-21	47 24	+ 552	-387.38	+2.73	-07	53.9	-23.9	7	23	07.4
13 SA	-21	37 47	+ 577	-384.53	+2.85	-08	17.3	-23.4	7	27	04.0
14 SU	-21	27 45	+ 602	-381.55	+2.97	-08	40.1	-22.8	7	31	00.5
15 MO	-21	17 17	+ 627	-378.46	+3.10	-09	02.2	-22.2	7	34	57.1
16 TU	-21	06 25	+ 652	-375.24	+3.22	-09	23.8	-21.5	7	38	53.7
17 WE	-20	55 09	+ 676	-371.90	+3.34	-09	44.6	-20.9	7	42	50.2
18 TH	-20	43 29	+ 700	-368.44	+3.46	-10	04.8	-20.2	7	46	46.8
19 FR	-20	31 25	+ 724	-364.87	+3.58	-10	24.4	-19.5	7	50	43.3
20 SA	-20	18 58	+ 747	-361.18	+3.69	-10	43.2	-18.8	7	54	39.9
21 SU	-20	06 08	+ 770	-357.37	+3.80	-11	01.2	-18.1	7	58	36.5
22 MO	-19	52 56	+ 793	-353.46	+3.92	-11	18.6	-17.3	8	02	33.0
23 TU	-19	39 21	+ 815	-349.44	+4.02	-11	35.1	-16.6	8	06	29.6
24 WE	-19	25 24	+ 837	-345.31	+4.13	-11	50.9	-15.8	8	10	26.1
25 TH	-19	11 06	+ 858	-341.07	+4.24	-12	05.8	-15.0	8	14	22.7
26 FR	-18	56 27	+ 879	-336.73	+4.34	-12	20.0	-14.2	8	18	19.2
27 SA	-18	41 27	+ 900	-332.28	+4.44	-12	33.4	-13.3	8	22	15.8
28 SU	-18	26 07	+ 920	-327.74	+4.54	-12	45.9	-12.5	8	26	12.3
29 MO	-18	10 27	+ 940	-323.09	+4.64	-12	57.6	-11.7	8	30	08.9
30 TU	-17	54 27	+ 960	-318.35	+4.74	-13	08.4	-10.9	8	34	05.4
31 WE	-17	38 08	+ 979	-313.52	+4.83	-13	18.5	-10.0	8	38	02.0
			+ 998		+4.93			- 9.2			

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME				
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC	
	°	' "	DAILY CHANGE (SEC)	MILS							DAILY CHANGE (MILS)
FEB 1 TH	-17	21 30	+1016	-308.59	+5.02	-13	27.7	- 8.4	8	41	58.6
2 FR	-17	04 34	+1034	-303.58	+5.11	-13	36.0	- 7.5	8	45	55.1
3 SA	-16	47 20	+1052	-298.47	+5.20	-13	43.6	- 6.7	8	49	51.7
4 SU	-16	29 48	+1069	-293.28	+5.28	-13	50.3	- 5.9	8	53	48.2
5 MO	-16	11 59	+1086	-288.00	+5.36	-13	56.2	- 5.1	8	57	44.8
6 TU	-15	53 54	+1102	-282.64	+5.44	-14	01.3	- 4.3	9	01	41.3
7 WE	-15	35 32	+1118	-277.19	+5.52	-14	05.6	- 3.5	9	05	37.9
8 TH	-15	16 53	+1134	-271.67	+5.60	-14	09.1	- 2.7	9	09	34.4
9 FR	-14	58 00	+1149	-266.07	+5.67	-14	11.8	- 1.9	9	13	31.0
10 SA	-14	38 51	+1164	-260.40	+5.75	-14	13.8	- 1.2	9	17	27.5
11 SU	-14	19 27	+1178	-254.65	+5.82	-14	14.9	- 0.4	9	21	24.1
12 MO	-13	59 49	+1192	-248.83	+5.89	-14	15.4	+ 0.3	9	25	20.6
13 TU	-13	39 57	+1206	-242.95	+5.96	-14	15.0	+ 1.1	9	29	17.2
14 WE	-13	19 51	+1219	-236.99	+6.02	-14	14.0	+ 1.8	9	33	13.8
15 TH	-12	59 32	+1232	-230.97	+6.08	-14	12.2	+ 2.5	9	37	10.3
16 FR	-12	39 00	+1244	-224.89	+6.14	-14	09.7	+ 3.2	9	41	06.9
17 SA	-12	18 17	+1256	-218.75	+6.20	-14	06.4	+ 3.9	9	45	03.4
18 SU	-11	57 21	+1267	-212.55	+6.26	-14	02.5	+ 4.6	9	49	00.0
19 MO	-11	36 14	+1278	-206.29	+6.31	-13	57.9	+ 5.3	9	52	56.5
20 TU	-11	14 56	+1288	-199.98	+6.36	-13	52.6	+ 6.0	9	56	53.1
21 WE	-10	53 28	+1299	-193.62	+6.41	-13	46.6	+ 6.6	10	00	49.6
22 TH	-10	31 49	+1308	-187.20	+6.46	-13	40.0	+ 7.3	10	04	46.2
23 FR	-10	10 01	+1318	-180.74	+6.51	-13	32.7	+ 7.9	10	08	42.7
24 SA	- 9	48 03	+1326	-174.24	+6.55	-13	24.8	+ 8.6	10	12	39.3
25 SU	- 9	25 57	+1335	-167.69	+6.59	-13	16.2	+ 9.2	10	16	35.8
26 MO	- 9	03 42	+1343	-161.10	+6.63	-13	07.0	+ 9.8	10	20	32.4
27 TU	- 8	41 19	+1351	-154.46	+6.67	-12	57.3	+10.3	10	24	29.0
28 WE	- 8	18 48	+1358	-147.79	+6.71	-12	46.9	+10.9	10	28	25.5
29 TH	- 7	56 11	+1365	-141.09	+6.74	-12	36.0	+11.4	10	32	22.1

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "	DAILY CHANGE (SEC)	MILS						
MAR 1 FR	- 7	33 26		-134.35		-12 24.6		10	36	18.6
2 SA	- 7	10 35	+1371	-127.58	+6.77	-12 12.6	+12.0	10	40	15.2
3 SU	- 6	47 38	+1377	-120.78	+6.80	-12 00.2	+12.5	10	44	11.7
4 MO	- 6	24 35	+1383	-113.95	+6.83	-11 47.2	+12.9	10	48	08.3
5 TU	- 6	01 27	+1388	-107.10	+6.85	-11 33.8	+13.4	10	52	04.8
6 WE	- 5	38 14	+1393	-100.22	+6.88	-11 20.0	+13.8	10	56	01.4
7 TH	- 5	14 56	+1398	- 93.31	+6.90	-11 05.8	+14.2	10	59	57.9
8 FR	- 4	51 34	+1402	- 86.39	+6.92	-10 51.2	+14.6	11	03	54.5
9 SA	- 4	28 08	+1406	- 79.45	+6.94	-10 36.2	+15.0	11	07	51.0
10 SU	- 4	04 39	+1409	- 72.49	+6.96	-10 20.8	+15.3	11	11	47.6
11 MO	- 3	41 07	+1412	- 65.51	+6.97	-10 05.2	+15.6	11	15	44.1
12 TU	- 3	17 31	+1415	- 58.53	+6.99	-09 49.3	+15.9	11	19	40.7
13 WE	- 2	53 54	+1418	- 51.53	+7.00	-09 33.0	+16.2	11	23	37.2
14 TH	- 2	30 14	+1420	- 44.52	+7.01	-09 16.6	+16.5	11	27	33.8
15 FR	- 2	06 33	+1421	- 37.50	+7.02	-08 59.9	+16.7	11	31	30.4
16 SA	- 1	42 51	+1422	- 30.47	+7.02	-08 42.9	+16.9	11	35	26.9
17 SU	- 1	19 08	+1423	- 23.45	+7.03	-08 25.8	+17.1	11	39	23.5
18 MO	- 0	55 24	+1424	- 16.42	+7.03	-08 08.5	+17.3	11	43	20.0
19 TU	- 0	31 40	+1424	- 9.38	+7.03	-07 51.1	+17.5	11	47	16.6
20 WE	- 0	07 57	+1423	- 2.36	+7.03	-07 33.5	+17.6	11	51	13.1
21 TH	+ 0	15 46	+1423	+ 4.67	+7.03	-07 15.7	+17.7	11	55	09.6
22 FR	+ 0	39 27	+1422	+ 11.69	+7.02	-06 57.9	+17.9	11	59	06.2
23 SA	+ 1	03 07	+1420	+ 18.70	+7.01	-06 39.9	+18.0	12	03	02.7
24 SU	+ 1	26 46	+1418	+ 25.71	+7.00	-06 21.9	+18.0	12	06	59.3
25 MO	+ 1	50 22	+1416	+ 32.70	+6.99	-06 03.8	+18.1	12	10	55.9
26 TU	+ 2	13 55	+1414	+ 39.68	+6.98	-05 45.6	+18.1	12	14	52.4
27 WE	+ 2	37 26	+1411	+ 46.65	+6.97	-05 27.5	+18.2	12	18	49.0
28 TH	+ 3	00 54	+1407	+ 53.60	+6.95	-05 09.3	+18.2	12	22	45.5
29 FR	+ 3	24 17	+1404	+ 60.53	+6.93	-04 51.1	+18.2	12	26	42.1
30 SA	+ 3	47 37	+1400	+ 67.44	+6.91	-04 33.0	+18.1	12	30	38.6
31 SU	+ 4	10 53	+1396	+ 74.33	+6.89	-04 14.9	+18.1	12	34	35.2
			+1391		+6.87		+18.0			

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "	DAILY CHANGE (SEC)	MILS						
APR 1 MO	+ 4	34 04	+1386	+ 81.20	+6.84	-03 56.9	+17.9	12	38	31.7
2 TU	+ 4	57 09	+1381	+ 88.05	+6.82	-03 39.0	+17.8	12	42	28.3
3 WE	+ 5	20 10	+1375	+ 94.86	+6.79	-03 21.3	+17.6	12	46	24.8
4 TH	+ 5	43 05	+1369	+101.65	+6.76	-03 03.6	+17.5	12	50	21.4
5 FR	+ 6	05 54	+1363	+108.41	+6.73	-02 46.2	+17.3	12	54	17.9
6 SA	+ 6	28 36	+1356	+115.14	+6.70	-02 28.9	+17.1	12	58	14.5
7 SU	+ 6	51 12	+1349	+121.84	+6.66	-02 11.8	+16.8	13	02	11.0
8 MO	+ 7	13 41	+1342	+128.50	+6.63	-01 55.0	+16.6	13	06	07.6
9 TU	+ 7	36 03	+1334	+135.13	+6.59	-01 38.4	+16.3	13	10	04.1
10 WE	+ 7	58 17	+1326	+141.72	+6.55	-01 22.1	+16.0	13	14	00.7
11 TH	+ 8	20 24	+1318	+148.26	+6.51	-01 06.1	+15.7	13	17	57.3
12 FR	+ 8	42 22	+1309	+154.77	+6.46	-00 50.4	+15.4	13	21	53.8
13 SA	+ 9	04 11	+1300	+161.24	+6.42	-00 35.0	+15.0	13	25	50.4
14 SU	+ 9	25 51	+1291	+167.66	+6.38	-00 20.0	+14.7	13	29	46.9
15 MO	+ 9	47 22	+1281	+174.03	+6.33	-00 05.3	+14.3	13	33	43.5
16 TU	+10	08 43	+1271	+180.36	+6.28	+00 09.1	+13.9	13	37	40.0
17 WE	+10	29 55	+1261	+186.64	+6.23	+00 23.0	+13.6	13	41	36.6
18 TH	+10	50 55	+1250	+192.87	+6.17	+00 36.6	+13.2	13	45	33.1
19 FR	+11	11 46	+1239	+199.04	+6.12	+00 49.7	+12.8	13	49	29.7
20 SA	+11	32 25	+1228	+205.16	+6.06	+01 02.5	+12.3	13	53	26.2
21 SU	+11	52 52	+1216	+211.22	+6.00	+01 14.8	+11.9	13	57	22.8
22 MO	+12	13 08	+1204	+217.22	+5.95	+01 26.7	+11.5	14	01	19.3
23 TU	+12	33 12	+1191	+223.17	+5.88	+01 38.2	+11.0	14	05	15.9
24 WE	+12	53 03	+1179	+229.05	+5.82	+01 49.2	+10.6	14	09	12.4
25 TH	+13	12 42	+1165	+234.87	+5.75	+01 59.8	+10.1	14	13	09.0
26 FR	+13	32 07	+1152	+240.63	+5.69	+02 09.9	+ 9.6	14	17	05.5
27 SA	+13	51 19	+1138	+246.32	+5.62	+02 19.5	+ 9.1	14	21	02.1
28 SU	+14	10 17	+1124	+251.94	+5.55	+02 28.7	+ 8.6	14	24	58.6
29 MO	+14	29 02	+1110	+257.49	+5.48	+02 37.3	+ 8.1	14	28	55.2
30 TU	+14	47 31	+1095	+262.97	+5.41	+02 45.5	+ 7.6	14	32	51.7

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS		MIN SEC		HR MIN SEC		
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)					
MAY 1 WE	+15 05 47		+268.38		+02 53.1		14 36 48.3		
2 TH	+15 23 47	+1080	+273.71	+5.33	+03 00.2	+ 7.1	14 40 44.8		
3 FR	+15 41 31	+1065	+278.97	+5.26	+03 06.7	+ 6.6	14 44 41.4		
4 SA	+15 59 01	+1049	+284.15	+5.18	+03 12.8	+ 6.0	14 48 38.0		
5 SU	+16 16 14	+1033	+289.25	+5.10	+03 18.2	+ 5.5	14 52 34.5		
6 MO	+16 33 11	+1017	+294.28	+5.02	+03 23.1	+ 4.9	14 56 31.1		
7 TU	+16 49 52	+1001	+299.22	+4.94	+03 27.4	+ 4.3	15 00 27.6		
8 WE	+17 06 16	+ 984	+304.08	+4.86	+03 31.2	+ 3.7	15 04 24.2		
9 TH	+17 22 22	+ 967	+308.85	+4.78	+03 34.3	+ 3.1	15 08 20.8		
10 FR	+17 38 12	+ 949	+313.54	+4.69	+03 36.9	+ 2.6	15 12 17.3		
11 SA	+17 53 44	+ 932	+318.14	+4.60	+03 38.8	+ 2.0	15 16 13.9		
12 SU	+18 08 57	+ 914	+322.65	+4.51	+03 40.2	+ 1.4	15 20 10.4		
13 MO	+18 23 53	+ 896	+327.08	+4.42	+03 41.0	+ 0.8	15 24 07.0		
14 TU	+18 38 30	+ 877	+331.41	+4.33	+03 41.1	+ 0.2	15 28 03.5		
15 WE	+18 52 48	+ 858	+335.64	+4.24	+03 40.7	- 0.4	15 32 00.1		
16 TH	+19 06 47	+ 839	+339.79	+4.14	+03 39.8	- 1.0	15 35 56.6		
17 FR	+19 20 27	+ 820	+343.84	+4.05	+03 38.2	- 1.5	15 39 53.2		
18 SA	+19 33 47	+ 800	+347.79	+3.95	+03 36.1	- 2.1	15 43 49.7		
19 SU	+19 46 47	+ 780	+351.64	+3.85	+03 33.5	- 2.7	15 47 46.3		
20 MO	+19 59 26	+ 760	+355.39	+3.75	+03 30.3	- 3.2	15 51 42.8		
21 TU	+20 11 46	+ 739	+359.04	+3.65	+03 26.5	- 3.7	15 55 39.4		
22 WE	+20 23 44	+ 719	+362.59	+3.55	+03 22.3	- 4.2	15 59 36.0		
23 TH	+20 35 22	+ 698	+366.03	+3.45	+03 17.5	- 4.8	16 03 32.5		
24 FR	+20 46 38	+ 676	+369.37	+3.34	+03 12.3	- 5.3	16 07 29.1		
25 SA	+20 57 33	+ 655	+372.61	+3.23	+03 06.5	- 5.7	16 11 25.6		
26 SU	+21 08 06	+ 633	+375.73	+3.13	+03 00.3	- 6.2	16 15 22.2		
27 MO	+21 18 18	+ 611	+378.75	+3.02	+02 53.6	- 6.7	16 19 18.7		
28 TU	+21 28 07	+ 589	+381.66	+2.91	+02 46.5	- 7.1	16 23 15.3		
29 WE	+21 37 33	+ 567	+384.46	+2.80	+02 38.9	- 7.6	16 27 11.8		
30 TH	+21 46 38	+ 544	+387.15	+2.69	+02 30.9	- 8.0	16 31 08.4		
31 FR	+21 55 19	+ 522	+389.72	+2.58	+02 22.5	- 8.4	16 35 04.9		
		+ 499		+2.46		- 8.8			

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "	DAILY CHANGE (SEC)	DAILY CHANGE (MILS)						
JUN 1 SA	+22	03 38		+392.19	+02	13.7	- 9.2	16	39	01.5
2 SU	+22	11 33	+ 476	+394.54	+02	04.5	- 9.6	16	42	58.1
3 MO	+22	19 06	+ 452	+396.77	+01	54.9	-10.0	16	46	54.6
4 TU	+22	26 15	+ 429	+398.89	+01	45.0	-10.3	16	50	51.2
5 WE	+22	33 00	+ 405	+400.89	+01	34.7	-10.7	16	54	47.8
6 TH	+22	39 22	+ 382	+402.77	+01	24.0	-11.0	16	58	44.3
7 FR	+22	45 20	+ 358	+404.54	+01	13.0	-11.3	17	02	40.9
8 SA	+22	50 54	+ 334	+406.19	+01	01.7	-11.6	17	06	37.4
9 SU	+22	56 04	+ 310	+407.72	+00	50.2	-11.8	17	10	34.0
10 MO	+23	00 49	+ 286	+409.13	+00	38.3	-12.1	17	14	30.5
11 TU	+23	05 11	+ 261	+410.42	+00	26.2	-12.3	17	18	27.1
12 WE	+23	09 08	+ 237	+411.59	+00	13.9	-12.5	17	22	23.6
13 TH	+23	12 40	+ 213	+412.64	+00	01.4	-12.7	17	26	20.2
14 FR	+23	15 48	+ 188	+413.57	-00	11.2	-12.8	17	30	16.7
15 SA	+23	18 32	+ 163	+414.38	-00	24.0	-12.9	17	34	13.3
16 SU	+23	20 50	+ 139	+415.06	-00	37.0	-13.0	17	38	09.9
17 MO	+23	22 44	+ 114	+415.63	-00	50.0	-13.1	17	42	06.4
18 TU	+23	24 14	+ 89	+416.07	-01	03.1	-13.1	17	46	03.0
19 WE	+23	25 18	+ 65	+416.39	-01	16.2	-13.1	17	49	59.5
20 TH	+23	25 58	+ 40	+416.58	-01	29.3	-13.1	17	53	56.1
21 FR	+23	26 13	+ 15	+416.66	-01	42.4	-13.1	17	57	52.7
22 SA	+23	26 03	- 10	+416.61	-01	55.5	-13.0	18	01	49.2
23 SU	+23	25 29	- 35	+416.44	-02	08.5	-12.9	18	05	45.8
24 MO	+23	24 29	- 59	+416.14	-02	21.4	-12.8	18	09	42.3
25 TU	+23	23 05	- 84	+415.73	-02	34.1	-12.6	18	13	38.9
26 WE	+23	21 16	- 109	+415.19	-02	46.8	-12.5	18	17	35.4
27 TH	+23	19 03	- 133	+414.53	-02	59.3	-12.3	18	21	32.0
28 FR	+23	16 25	- 158	+413.75	-03	11.5	-12.1	18	25	28.5
29 SA	+23	13 23	- 182	+412.85	-03	23.6	-11.8	18	29	25.1
30 SU	+23	09 56	- 207	+411.83	-03	35.5	-11.6	18	33	21.7
			- 231	-1.14						

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
JUL 1 MO	+23 06 04		+410.69		-03 47.1			18 37 18.2		
2 TU	+23 01 49	- 255	+409.43	-1.26	-03 58.4	-11.3		18 41 14.8		
3 WE	+22 57 09	- 280	+408.05	-1.38	-04 09.5	-11.1		18 45 11.3		
4 TH	+22 52 06	- 304	+406.55	-1.50	-04 20.3	-10.8		18 49 07.9		
5 FR	+22 46 38	- 327	+404.93	-1.61	-04 30.7	-10.5		18 53 04.5		
6 SA	+22 40 47	- 351	+403.20	-1.73	-04 40.9	-10.2		18 57 01.0		
7 SU	+22 34 32	- 375	+401.34	-1.85	-04 50.7	- 9.8		19 00 57.6		
8 MO	+22 27 54	- 398	+399.38	-1.97	-05 00.2	- 9.5		19 04 54.1		
9 TU	+22 20 52	- 422	+397.29	-2.08	-05 09.2	- 9.1		19 08 50.7		
10 WE	+22 13 27	- 445	+395.10	-2.20	-05 17.9	- 8.7		19 12 47.2		
11 TH	+22 05 39	- 468	+392.79	-2.31	-05 26.2	- 8.3		19 16 43.8		
12 FR	+21 57 29	- 491	+390.36	-2.42	-05 34.1	- 7.8		19 20 40.3		
13 SA	+21 48 55	- 513	+387.83	-2.53	-05 41.5	- 7.4		19 24 36.9		
14 SU	+21 40 00	- 536	+385.18	-2.65	-05 48.4	- 6.9		19 28 33.5		
15 MO	+21 30 42	- 558	+382.43	-2.76	-05 54.8	- 6.4		19 32 30.0		
16 TU	+21 21 02	- 580	+379.57	-2.86	-06 00.8	- 5.9		19 36 26.6		
17 WE	+21 11 01	- 601	+376.60	-2.97	-06 06.2	- 5.4		19 40 23.1		
18 TH	+21 00 38	- 623	+373.52	-3.08	-06 11.1	- 4.9		19 44 19.7		
19 FR	+20 49 54	- 644	+370.34	-3.18	-06 15.5	- 4.3		19 48 16.2		
20 SA	+20 38 48	- 665	+367.05	-3.28	-06 19.2	- 3.8		19 52 12.8		
21 SU	+20 27 22	- 686	+363.66	-3.39	-06 22.5	- 3.2		19 56 09.3		
22 MO	+20 15 35	- 707	+360.18	-3.49	-06 25.1	- 2.6		20 00 05.9		
23 TU	+20 03 29	- 727	+356.59	-3.59	-06 27.1	- 2.0		20 04 02.4		
24 WE	+19 51 02	- 747	+352.90	-3.69	-06 28.6	- 1.4		20 07 59.0		
25 TH	+19 38 15	- 767	+349.11	-3.79	-06 29.4	- 0.8		20 11 55.6		
26 FR	+19 25 08	- 786	+345.23	-3.88	-06 29.6	- 0.2		20 15 52.1		
27 SA	+19 11 43	- 806	+341.25	-3.98	-06 29.3	+ 0.4		20 19 48.7		
28 SU	+18 57 58	- 825	+337.18	-4.07	-06 28.2	+ 1.0		20 23 45.2		
29 MO	+18 43 55	- 843	+333.01	-4.16	-06 26.6	+ 1.6		20 27 41.8		
30 TU	+18 29 34	- 862	+328.76	-4.26	-06 24.4	+ 2.2		20 31 38.4		
31 WE	+18 14 54	- 880	+324.41	-4.35	-06 21.5	+ 2.8		20 35 34.9		
		- 898		-4.43		+ 3.5				

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS		MIN SEC		DAILY CHANGE (SEC)	HR MIN SEC		
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
AUG 1 TH	+17 59 56		+319.98		-06 18.1			20 39 31.5		
2 FR	+17 44 41	- 915	+315.46	-4.52	-06 14.0	+ 4.1		20 43 28.0		
3 SA	+17 29 08	- 933	+310.85	-4.61	-06 09.4	+ 4.6		20 47 24.6		
4 SU	+17 13 18	- 950	+306.16	-4.69	-06 04.2	+ 5.2		20 51 21.1		
5 MO	+16 57 11	- 967	+301.39	-4.78	-05 58.3	+ 5.8		20 55 17.7		
6 TU	+16 40 48	- 983	+296.53	-4.85	-05 52.0	+ 6.4		20 59 14.2		
7 WE	+16 24 09	- 999	+291.60	-4.93	-05 45.0	+ 7.0		21 03 10.8		
8 TH	+16 07 13	-1015	+286.58	-5.01	-05 37.4	+ 7.5		21 07 07.3		
9 FR	+15 50 02	-1031	+281.49	-5.09	-05 29.3	+ 8.1		21 11 03.9		
10 SA	+15 32 36	-1046	+276.33	-5.17	-05 20.7	+ 8.7		21 15 00.4		
11 SU	+15 14 55	-1061	+271.09	-5.24	-05 11.4	+ 9.2		21 18 57.0		
12 MO	+14 56 59	-1076	+265.77	-5.31	-05 01.6	+ 9.8		21 22 53.6		
13 TU	+14 38 49	-1090	+260.39	-5.38	-04 51.3	+10.3		21 26 50.1		
14 WE	+14 20 25	-1104	+254.94	-5.45	-04 40.4	+10.9		21 30 46.7		
15 TH	+14 01 47	-1118	+249.42	-5.52	-04 29.0	+11.4		21 34 43.2		
16 FR	+13 42 56	-1131	+243.83	-5.59	-04 17.0	+12.0		21 38 39.8		
17 SA	+13 23 52	-1144	+238.18	-5.65	-04 04.6	+12.5		21 42 36.3		
18 SU	+13 04 35	-1157	+232.47	-5.71	-03 51.6	+13.0		21 46 32.9		
19 MO	+12 45 06	-1169	+226.70	-5.77	-03 38.0	+13.5		21 50 29.4		
20 TU	+12 25 25	-1181	+220.86	-5.83	-03 24.0	+14.0		21 54 26.0		
21 WE	+12 05 32	-1193	+214.97	-5.89	-03 09.5	+14.5		21 58 22.5		
22 TH	+11 45 27	-1204	+209.02	-5.95	-02 54.5	+15.0		22 02 19.1		
23 FR	+11 25 12	-1216	+203.02	-6.00	-02 39.1	+15.5		22 06 15.6		
24 SA	+11 04 46	-1226	+196.97	-6.05	-02 23.2	+15.9		22 10 12.2		
25 SU	+10 44 09	-1237	+190.86	-6.11	-02 06.8	+16.4		22 14 08.7		
26 MO	+10 23 22	-1247	+184.70	-6.16	-01 50.0	+16.8		22 18 05.3		
27 TU	+10 02 25	-1257	+178.50	-6.21	-01 32.9	+17.2		22 22 01.9		
28 WE	+ 9 41 19	-1266	+172.24	-6.25	-01 15.3	+17.6		22 25 58.4		
29 TH	+ 9 20 04	-1275	+165.95	-6.30	-00 57.4	+17.9		22 29 55.0		
30 FR	+ 8 58 40	-1284	+159.60	-6.34	-00 39.1	+18.3		22 33 51.5		
31 SA	+ 8 37 07	-1293	+153.22	-6.39	-00 20.5	+18.6		22 37 48.1		
		-1301		-6.42		+18.9				

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS						
	°	' "	DAILY CHANGE (SEC)	DAILY CHANGE (MILS)	MIN	SEC	DAILY CHANGE (SEC)	HR	MIN SEC
SEP 1 SU	+ 8	15 25	-1309	+146.79	-00	01.6	+19.2	22	41 44.6
2 MO	+ 7	53 36	-1317	+140.33	+00	17.6	+19.5	22	45 41.2
3 TU	+ 7	31 39	-1324	+133.82	+00	37.1	+19.7	22	49 37.7
4 WE	+ 7	09 34	-1332	+127.28	+00	56.8	+19.9	22	53 34.3
5 TH	+ 6	47 23	-1338	+120.71	+01	16.7	+20.1	22	57 30.8
6 FR	+ 6	25 05	-1345	+114.10	+01	36.9	+20.3	23	01 27.4
7 SA	+ 6	02 40	-1351	+107.46	+01	57.2	+20.5	23	05 23.9
8 SU	+ 5	40 09	-1356	+100.79	+02	17.7	+20.7	23	09 20.5
9 MO	+ 5	17 33	-1362	+ 94.09	+02	38.4	+20.8	23	13 17.0
10 TU	+ 4	54 51	-1367	+ 87.36	+02	59.2	+20.9	23	17 13.6
11 WE	+ 4	32 04	-1372	+ 80.61	+03	20.1	+21.0	23	21 10.1
12 TH	+ 4	09 12	-1376	+ 73.84	+03	41.1	+21.1	23	25 06.7
13 FR	+ 3	46 16	-1380	+ 67.04	+04	02.2	+21.2	23	29 03.2
14 SA	+ 3	23 16	-1384	+ 60.23	+04	23.4	+21.3	23	32 59.8
15 SU	+ 3	00 12	-1387	+ 53.39	+04	44.7	+21.3	23	36 56.3
16 MO	+ 2	37 05	-1390	+ 46.54	+05	06.0	+21.3	23	40 52.9
17 TU	+ 2	13 55	-1393	+ 39.68	+05	27.3	+21.3	23	44 49.4
18 WE	+ 1	50 42	-1395	+ 32.80	+05	48.7	+21.3	23	48 46.0
19 TH	+ 1	27 27	-1397	+ 25.91	+06	10.0	+21.3	23	52 42.5
20 FR	+ 1	04 10	-1399	+ 19.01	+06	31.3	+21.3	23	56 39.1
21 SA	+ 0	40 51	-1400	+ 12.10	+06	52.6	+21.2	0	00 35.7
22 SU	+ 0	17 31	-1401	+ 5.19	+07	13.8	+21.1	0	04 32.2
23 MO	- 0	05 50	-1402	- 1.73	+07	34.9	+21.0	0	08 28.8
24 TU	- 0	29 12	-1402	- 8.65	+07	55.9	+20.9	0	12 25.3
25 WE	- 0	52 33	-1402	- 15.57	+08	16.8	+20.7	0	16 21.9
26 TH	- 1	15 55	-1401	- 22.50	+08	37.5	+20.5	0	20 18.4
27 FR	- 1	39 17	-1401	- 29.42	+08	58.0	+20.3	0	24 15.0
28 SA	- 2	02 37	-1400	- 36.33	+09	18.4	+20.1	0	28 11.5
29 SU	- 2	25 57	-1398	- 43.25	+09	38.4	+19.8	0	32 08.1
30 MO	- 2	49 16	-1397	- 50.15	+09	58.3	+19.6	0	36 04.6

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS							
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
					MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
OCT 1 TU	- 3 12 33	-1395	- 57.05	-6.89	+10 17.8		+19.3	0	40	01.2
2 WE	- 3 35 47	-1392	- 63.94	-6.87	+10 37.1		+18.9	0	43	57.7
3 TH	- 3 59 00	-1390	- 70.81	-6.86	+10 56.0		+18.6	0	47	54.3
4 FR	- 4 22 10	-1387	- 77.68	-6.85	+11 14.6		+18.2	0	51	50.8
5 SA	- 4 45 16	-1383	- 84.52	-6.83	+11 32.8		+17.8	0	55	47.4
6 SU	- 5 08 20	-1379	- 91.36	-6.81	+11 50.7		+17.4	0	59	43.9
7 MO	- 5 31 19	-1375	- 98.17	-6.79	+12 08.1		+17.0	1	03	40.5
8 TU	- 5 54 14	-1371	-104.96	-6.77	+12 25.1		+16.6	1	07	37.0
9 WE	- 6 17 05	-1366	-111.73	-6.75	+12 41.6		+16.1	1	11	33.6
10 TH	- 6 39 51	-1360	-118.47	-6.72	+12 57.7		+15.6	1	15	30.1
11 FR	- 7 02 31	-1355	-125.19	-6.69	+13 13.3		+15.1	1	19	26.7
12 SA	- 7 25 06	-1349	-131.88	-6.66	+13 28.5		+14.6	1	23	23.2
13 SU	- 7 47 35	-1342	-138.54	-6.63	+13 43.1		+14.1	1	27	19.8
14 MO	- 8 09 57	-1335	-145.17	-6.59	+13 57.2		+13.6	1	31	16.3
15 TU	- 8 32 13	-1328	-151.77	-6.56	+14 10.7		+13.0	1	35	12.9
16 WE	- 8 54 21	-1321	-158.32	-6.52	+14 23.8		+12.4	1	39	09.4
17 TH	- 9 16 21	-1313	-164.85	-6.48	+14 36.2		+11.9	1	43	06.0
18 FR	- 9 38 14	-1304	-171.33	-6.44	+14 48.1		+11.3	1	47	02.6
19 SA	- 9 59 58	-1295	-177.77	-6.40	+14 59.3		+10.7	1	50	59.1
20 SU	-10 21 33	-1286	-184.16	-6.35	+15 10.0		+10.0	1	54	55.7
21 MO	-10 42 59	-1276	-190.51	-6.30	+15 20.0		+ 9.4	1	58	52.2
22 TU	-11 04 15	-1266	-196.82	-6.25	+15 29.4		+ 8.7	2	02	48.8
23 WE	-11 25 22	-1256	-203.07	-6.20	+15 38.2		+ 8.1	2	06	45.3
24 TH	-11 46 18	-1245	-209.27	-6.15	+15 46.3		+ 7.4	2	10	41.9
25 FR	-12 07 03	-1234	-215.42	-6.09	+15 53.6		+ 6.7	2	14	38.4
26 SA	-12 27 37	-1222	-221.52	-6.03	+16 00.3		+ 5.9	2	18	35.0
27 SU	-12 47 59	-1211	-227.55	-5.98	+16 06.2		+ 5.2	2	22	31.5
28 MO	-13 08 10	-1198	-233.53	-5.92	+16 11.4		+ 4.4	2	26	28.1
29 TU	-13 28 08	-1186	-239.45	-5.86	+16 15.9		+ 3.7	2	30	24.6
30 WE	-13 47 54	-1172	-245.30	-5.79	+16 19.5		+ 2.9	2	34	21.2
31 TH	-14 07 26	-1159	-251.09	-5.72	+16 22.4		+ 2.1	2	38	17.7

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "	DAILY CHANGE (SEC)	DAILY CHANGE (MILS)						
NOV 1 FR	-14	26 45		-256.81	+16	24.4		2	42	14.3
2 SA	-14	45 50	-1145	-5.65	+16	25.7	+ 1.2	2	46	10.9
3 SU	-15	04 41	-1131	-5.59	+16	26.1	+ 0.4	2	50	07.4
4 MO	-15	23 17	-1116	-5.51	+16	25.7	- 0.4	2	54	04.0
5 TU	-15	41 38	-1101	-5.44	+16	24.4	- 1.3	2	58	00.5
6 WE	-15	59 43	-1085	-5.36	+16	22.3	- 2.1	3	01	57.1
7 TH	-16	17 33	-1070	-5.28	+16	19.3	- 3.0	3	05	53.6
8 FR	-16	35 06	-1053	-5.20	+16	15.5	- 3.8	3	09	50.2
9 SA	-16	52 23	-1036	-5.12	+16	10.9	- 4.7	3	13	46.7
10 SU	-17	09 22	-1019	-5.03	+16	05.3	- 5.5	3	17	43.3
11 MO	-17	26 04	-1002	-4.95	+15	59.0	- 6.4	3	21	39.8
12 TU	-17	42 27	- 984	-4.86	+15	51.7	- 7.2	3	25	36.4
13 WE	-17	58 33	- 965	-4.77	+15	43.7	- 8.1	3	29	32.9
14 TH	-18	14 19	- 947	-4.68	+15	34.8	- 8.9	3	33	29.5
15 FR	-18	29 47	- 927	-4.58	+15	25.0	- 9.7	3	37	26.1
16 SA	-18	44 55	- 908	-4.48	+15	14.4	-10.6	3	41	22.6
17 SU	-18	59 43	- 888	-4.39	+15	03.0	-11.4	3	45	19.2
18 MO	-19	14 10	- 867	-4.28	+14	50.8	-12.2	3	49	15.7
19 TU	-19	28 17	- 847	-4.18	+14	37.8	-13.0	3	53	12.3
20 WE	-19	42 02	- 826	-4.08	+14	24.0	-13.8	3	57	08.8
21 TH	-19	55 26	- 804	-3.97	+14	09.4	-14.6	4	01	05.4
22 FR	-20	08 28	- 782	-3.86	+13	54.0	-15.4	4	05	01.9
23 SA	-20	21 08	- 760	-3.75	+13	37.8	-16.2	4	08	58.5
24 SU	-20	33 26	- 737	-3.64	+13	20.9	-16.9	4	12	55.1
25 MO	-20	45 21	- 715	-3.53	+13	03.2	-17.7	4	16	51.6
26 TU	-20	56 52	- 691	-3.41	+12	44.7	-18.5	4	20	48.2
27 WE	-21	08 00	- 668	-3.30	+12	25.5	-19.2	4	24	44.7
28 TH	-21	18 44	- 644	-3.18	+12	05.6	-19.9	4	28	41.3
29 FR	-21	29 04	- 620	-3.06	+11	45.0	-20.6	4	32	37.9
30 SA	-21	38 59	- 595	-2.94	+11	23.6	-21.3	4	36	34.4
			- 571	-2.82			-22.0			

Table 2d. Sun, 1996, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "	DAILY CHANGE (SEC)	MILS						
DEC 1 SU	-21	48 30		-387.70		+11 01.6		4	40	31.0
2 MO	-21	57 36	- 546	-390.40	-2.70	+10 38.9	-22.7	4	44	27.5
3 TU	-22	06 16	- 520	-392.97	-2.57	+10 15.6	-23.3	4	48	24.1
4 WE	-22	14 31	- 495	-395.41	-2.44	+09 51.6	-23.9	4	52	20.6
5 TH	-22	22 20	- 469	-397.73	-2.32	+09 27.1	-24.5	4	56	17.2
6 FR	-22	29 43	- 443	-399.92	-2.19	+09 02.0	-25.1	5	00	13.7
7 SA	-22	36 40	- 417	-401.97	-2.06	+08 36.3	-25.7	5	04	10.3
8 SU	-22	43 10	- 390	-403.90	-1.93	+08 10.1	-26.2	5	08	06.8
9 MO	-22	49 13	- 363	-405.69	-1.79	+07 43.5	-26.7	5	12	03.4
10 TU	-22	54 49	- 336	-407.36	-1.66	+07 16.4	-27.1	5	16	00.0
11 WE	-22	59 59	- 309	-408.88	-1.53	+06 48.9	-27.5	5	19	56.5
12 TH	-23	04 41	- 282	-410.28	-1.39	+06 21.0	-27.9	5	23	53.1
13 FR	-23	08 55	- 255	-411.53	-1.26	+05 52.7	-28.3	5	27	49.6
14 SA	-23	12 42	- 227	-412.65	-1.12	+05 24.1	-28.6	5	31	46.2
15 SU	-23	16 02	- 199	-413.64	-0.98	+04 55.3	-28.8	5	35	42.8
16 MO	-23	18 53	- 171	-414.48	-0.84	+04 26.2	-29.1	5	39	39.3
17 TU	-23	21 16	- 143	-415.19	-0.71	+04 00.0	-29.3	5	43	35.9
18 WE	-23	23 12	- 115	-415.76	-0.57	+03 57.0	-29.4	5	47	32.4
19 TH	-23	24 39	- 87	-416.19	-0.43	+03 27.5	-29.6	5	51	29.0
20 FR	-23	25 38	- 59	-416.48	-0.29	+02 58.0	-29.7	5	55	25.5
21 SA	-23	26 09	- 31	-416.64	-0.15	+02 28.3	-29.7	5	59	22.1
22 SU	-23	26 11	- 3	-416.65	-0.01	+01 58.5	-29.8	5	59	22.1
23 MO	-23	25 45	+ 26	-416.65	+0.13	+01 28.8	-29.8	6	03	18.6
24 TU	-23	24 52	+ 54	-416.52	+0.27	+00 59.0	-29.8	6	07	15.2
25 WE	-23	24 52	+ 82	-416.25	+0.40	+00 29.2	-29.7	6	11	11.8
26 TH	-23	23 29	+ 110	-415.85	+0.54	-00 00.5	-29.6	6	15	08.3
27 FR	-23	21 39	+ 139	-415.30	+0.69	-00 30.2	-29.5	6	19	04.9
28 SA	-23	19 20	+ 167	-414.62	+0.82	-00 59.7	-29.4	6	23	01.5
29 SU	-23	16 34	+ 195	-413.80	+0.96	-01 29.1	-29.2	6	26	58.0
30 MO	-23	13 19	+ 223	-412.83	+1.10	-01 58.3	-29.0	6	30	54.6
31 TU	-23	09 36	+ 250	-411.73	+1.23	-02 27.3	-28.8	6	34	51.1
32 WE	-23	05 26	+ 278	-410.50	+1.37	-02 56.1	-28.5	6	38	47.7
	-23	00 48		-409.12		-03 24.6		6	42	44.2

Table 2e. Sun, 1997, for zero hours universal time (GMT)

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
JAN 0 TU	-23 05 26		-410.50		-02	56.1		6	38	47.7
JAN 1 WE	-23 00 48	+ 278	-409.12	+1.37	-03	24.6	-28.5	6	42	44.2
2 TH	-22 55 42	+ 306	-407.61	+1.51	-03	52.8	-28.2	6	46	40.8
3 FR	-22 50 09	+ 333	-405.97	+1.64	-04	20.7	-27.9	6	50	37.3
4 SA	-22 44 08	+ 360	-404.19	+1.78	-04	48.3	-27.5	6	54	33.9
5 SU	-22 37 41	+ 388	-402.27	+1.92	-05	15.5	-27.2	6	58	30.4
6 MO	-22 30 46	+ 414	-400.23	+2.04	-05	42.2	-26.7	7	02	27.0
7 TU	-22 23 25	+ 441	-398.05	+2.18	-06	08.5	-26.3	7	06	23.6
8 WE	-22 15 37	+ 468	-395.74	+2.31	-06	34.3	-25.8	7	10	20.1
9 TH	-22 07 23	+ 494	-393.30	+2.44	-06	59.7	-25.3	7	14	16.7
10 FR	-21 58 44	+ 520	-390.73	+2.57	-07	24.5	-24.8	7	18	13.3
11 SA	-21 49 38	+ 546	-388.04	+2.70	-07	48.7	-24.2	7	22	09.8
12 SU	-21 40 07	+ 571	-385.22	+2.82	-07	48.7	-23.6	7	22	09.8
13 MO	-21 40 07	+ 596	-385.22	+2.94	-08	12.3	-23.0	7	26	06.4
14 TU	-21 30 11	+ 621	-382.28	+3.07	-08	35.3	-23.0	7	30	02.9
15 WE	-21 19 50	+ 646	-379.21	+3.19	-08	57.7	-22.4	7	33	59.5
16 TH	-21 09 04	+ 670	-376.02	+3.31	-09	19.3	-21.7	7	37	56.0
17 FR	-20 57 54	+ 694	-372.71	+3.43	-09	40.3	-21.0	7	41	52.6
18 SA	-20 46 20	+ 718	-369.29	+3.55	-09	40.3	-20.3	7	45	49.1
19 SU	-20 34 23	+ 741	-365.74	+3.66	-10	00.6	-19.6	7	49	45.7
20 MO	-20 22 02	+ 764	-362.08	+3.77	-10	20.2	-18.8	7	49	45.7
21 TU	-20 09 18	+ 787	-358.31	+3.89	-10	39.0	-18.1	7	53	42.2
22 WE	-20 09 18	+ 809	-354.43	+3.89	-10	57.1	-17.3	7	57	38.8
23 TH	-19 56 11	+ 831	-350.43	+4.00	-11	14.4	-17.3	8	01	35.4
24 FR	-19 42 42	+ 852	-346.33	+4.10	-11	31.0	-16.6	8	05	31.9
25 SA	-19 28 51	+ 874	-342.12	+4.21	-11	46.8	-15.8	8	09	28.5
26 SU	-19 14 39	+ 895	-337.80	+4.32	-11	46.8	-15.0	8	09	28.5
27 MO	-19 00 05	+ 915	-333.39	+4.42	-12	01.8	-14.2	8	13	25.0
28 TU	-18 45 11	+ 935	-328.87	+4.52	-12	16.0	-13.4	8	17	21.6
29 WE	-18 29 56	+ 955	-324.25	+4.62	-12	29.4	-12.6	8	21	18.2
30 TH	-18 14 20	+ 974	-319.53	+4.72	-12	42.0	-12.6	8	25	14.7
31 FR	-17 58 25	+ 993	-314.72	+4.81	-12	53.9	-11.8	8	29	11.3
	-17 42 11	+ 1012	-309.81	+5.00	-13	04.9	-11.0	8	33	07.8
	-17 25 37				-13	15.1	-10.2	8	37	04.4
							- 9.4	8	41	00.9
							- 8.6			

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS				DAILY CHANGE (SEC)			
	°	'	"	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)		MIN	SEC	HR MIN SEC
FEB 1 SA	-17	08	45	+1030	-304.82	+5.09	-13 33.2	- 7.8		8 44 57.5
2 SU	-16	51	35	+1048	-299.73	+5.18	-13 41.0	- 7.0		8 48 54.0
3 MO	-16	34	07	+1065	-294.55	+5.26	-13 48.1	- 6.2		8 52 50.6
4 TU	-16	16	22	+1082	-289.29	+5.34	-13 54.3	- 5.5		8 56 47.1
5 WE	-15	58	20	+1099	-283.95	+5.43	-13 59.8	- 4.7		9 00 43.7
6 TH	-15	40	01	+1115	-278.52	+5.51	-14 04.4	- 3.9		9 04 40.3
7 FR	-15	21	26	+1130	-273.02	+5.58	-14 08.3	- 3.1		9 08 36.8
8 SA	-15	02	36	+1146	-267.43	+5.66	-14 11.4	- 2.3		9 12 33.4
9 SU	-14	43	30	+1160	-261.78	+5.73	-14 13.7	- 1.5		9 16 29.9
10 MO	-14	24	09	+1175	-256.05	+5.80	-14 15.1	- 0.7		9 20 26.5
11 TU	-14	04	34	+1189	-250.24	+5.87	-14 15.8	+ 0.1		9 24 23.0
12 WE	-13	44	46	+1202	-244.37	+5.94	-14 15.7	+ 0.9		9 28 19.6
13 TH	-13	24	43	+1215	-238.44	+6.00	-14 14.9	+ 1.6		9 32 16.1
14 FR	-13	04	28	+1228	-232.43	+6.06	-14 13.2	+ 2.4		9 36 12.7
15 SA	-12	44	00	+1240	-226.37	+6.12	-14 10.8	+ 3.1		9 40 09.2
16 SU	-12	23	20	+1252	-220.24	+6.18	-14 07.7	+ 3.9		9 44 05.8
17 MO	-12	02	27	+1264	-214.06	+6.24	-14 03.8	+ 4.6		9 48 02.3
18 TU	-11	41	24	+1275	-207.82	+6.30	-13 59.2	+ 5.3		9 51 58.9
19 WE	-11	20	09	+1285	-201.53	+6.35	-13 53.9	+ 6.0		9 55 55.5
20 TH	-10	58	44	+1295	-195.18	+6.40	-13 48.0	+ 6.6		9 59 52.0
21 FR	-10	37	08	+1305	-188.78	+6.44	-13 41.3	+ 7.3		10 03 48.6
22 SA	-10	15	23	+1315	-182.34	+6.49	-13 34.0	+ 7.9		10 07 45.1
23 SU	- 9	53	28	+1324	-175.84	+6.54	-13 26.1	+ 8.5		10 11 41.7
24 MO	- 9	31	25	+1332	-169.31	+6.58	-13 17.6	+ 9.1		10 15 38.2
25 TU	- 9	09	12	+1341	-162.73	+6.62	-13 08.5	+ 9.7		10 19 34.8
26 WE	- 8	46	52	+1349	-156.11	+6.66	-12 58.8	+10.3		10 23 31.3
27 TH	- 8	24	23	+1356	-149.45	+6.70	-12 48.5	+10.8		10 27 27.9
28 FR	- 8	01	47	+1363	-142.75	+6.73	-12 37.7	+11.3		10 31 24.4

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN SEC		DAILY CHANGE (SEC)	HR MIN SEC		
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
MAR 1 SA	- 7 39 04		-136.02		-12 26.4			10 35 21.0		
2 SU	- 7 16 14	+1370	-129.26	+6.77	-12 14.6	+11.8		10 39 17.5		
3 MO	- 6 53 18	+1376	-122.46	+6.80	-12 02.4	+12.3		10 43 14.1		
4 TU	- 6 30 16	+1382	-115.63	+6.82	-11 49.6	+12.7		10 47 10.6		
5 WE	- 6 07 08	+1388	-108.78	+6.85	-11 36.5	+13.2		10 51 07.2		
6 TH	- 5 43 56	+1393	-101.90	+6.88	-11 22.9	+13.6		10 55 03.7		
7 FR	- 5 20 38	+1397	- 95.00	+6.90	-11 08.9	+14.0		10 59 00.3		
8 SA	- 4 57 17	+1402	- 88.08	+6.92	-10 54.6	+14.4		11 02 56.8		
9 SU	- 4 33 51	+1406	- 81.14	+6.94	-10 39.8	+14.7		11 06 53.4		
10 MO	- 4 10 22	+1409	- 74.18	+6.96	-10 24.7	+15.1		11 10 49.9		
11 TU	- 3 46 50	+1412	- 67.21	+6.97	-10 09.3	+15.4		11 14 46.5		
12 WE	- 3 23 15	+1415	- 60.22	+6.99	-09 53.5	+15.8		11 18 43.0		
13 TH	- 2 59 38	+1417	- 53.22	+7.00	-09 37.4	+16.1		11 22 39.6		
14 FR	- 2 35 59	+1419	- 46.22	+7.01	-09 21.1	+16.4		11 26 36.1		
15 SA	- 2 12 18	+1421	- 39.20	+7.02	-09 04.4	+16.6		11 30 32.7		
16 SU	- 1 48 36	+1422	- 32.18	+7.02	-08 47.5	+16.9		11 34 29.2		
17 MO	- 1 24 53	+1423	- 25.15	+7.03	-08 30.4	+17.1		11 38 25.8		
18 TU	- 1 01 10	+1423	- 18.13	+7.03	-08 13.0	+17.4		11 42 22.4		
19 WE	- 0 37 27	+1423	- 11.10	+7.03	-07 55.5	+17.5		11 46 18.9		
20 TH	- 0 13 44	+1423	- 4.07	+7.03	-07 37.8	+17.7		11 50 15.5		
21 FR	+ 0 09 58	+1422	+ 2.95	+7.02	-07 19.9	+17.9		11 54 12.0		
22 SA	+ 0 33 39	+1421	+ 9.97	+7.02	-07 01.9	+18.0		11 58 08.6		
23 SU	+ 0 57 19	+1420	+ 16.98	+7.01	-06 43.8	+18.1		12 02 05.1		
24 MO	+ 1 20 57	+1418	+ 23.98	+7.00	-06 25.7	+18.2		12 06 01.7		
25 TU	+ 1 44 33	+1416	+ 30.98	+6.99	-06 07.4	+18.2		12 09 58.2		
26 WE	+ 2 08 06	+1414	+ 37.96	+6.98	-05 49.2	+18.3		12 13 54.8		
27 TH	+ 2 31 37	+1411	+ 44.92	+6.97	-05 30.9	+18.3		12 17 51.3		
28 FR	+ 2 55 05	+1408	+ 51.88	+6.95	-05 12.7	+18.2		12 21 47.9		
29 SA	+ 3 18 30	+1405	+ 58.81	+6.94	-04 54.5	+18.2		12 25 44.4		
30 SU	+ 3 41 51	+1401	+ 65.73	+6.92	-04 36.3	+18.1		12 29 41.0		
31 MO	+ 4 05 07	+1397	+ 72.63	+6.90	-04 18.3	+18.1		12 33 37.5		
		+1392		+6.87		+18.0				

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS				DAILY CHANGE (SEC)			
	°	'	"	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)		MIN	SEC	HR MIN SEC
APR 1 TU	+ 4	28	20		+ 79.50			-04	00.3	12 37 34.1
2 WE	+ 4	51	27	+1388	+ 86.36	+6.85	+17.8	-03	42.5	12 41 30.6
3 TH	+ 5	14	30	+1382	+ 93.18	+6.82	+17.7	-03	24.8	12 45 27.2
4 FR	+ 5	37	27	+1377	+ 99.98	+6.80	+17.5	-03	07.3	12 49 23.7
5 SA	+ 6	00	18	+1371	+106.75	+6.77	+17.4	-02	49.9	12 53 20.3
6 SU	+ 6	23	03	+1365	+113.49	+6.74	+17.2	-02	32.8	12 57 16.8
7 MO	+ 6	45	41	+1358	+120.20	+6.71	+17.0	-02	15.8	13 01 13.4
8 TU	+ 7	08	12	+1351	+126.88	+6.67	+16.7	-01	59.1	13 05 09.9
9 WE	+ 7	30	37	+1344	+133.51	+6.64	+16.5	-01	42.6	13 09 06.5
10 TH	+ 7	52	53	+1337	+140.11	+6.60	+16.3	-01	26.3	13 13 03.0
11 FR	+ 8	15	02	+1329	+146.67	+6.56	+16.0	-01	10.3	13 16 59.6
12 SA	+ 8	37	02	+1320	+153.19	+6.52	+15.7	-00	54.6	13 20 56.1
13 SU	+ 8	58	53	+1312	+159.67	+6.48	+15.4	-00	39.1	13 24 52.7
14 MO	+ 9	20	36	+1302	+166.10	+6.43	+15.1	-00	24.0	13 28 49.3
15 TU	+ 9	42	09	+1293	+172.49	+6.39	+14.8	-00	09.1	13 32 45.8
16 WE	+10	03	32	+1283	+178.83	+6.34	+14.5	+00	05.4	13 36 42.4
17 TH	+10	24	46	+1273	+185.11	+6.29	+14.2	+00	19.5	13 40 38.9
18 FR	+10	45	49	+1263	+191.35	+6.24	+13.8	+00	33.3	13 44 35.5
19 SA	+11	06	41	+1252	+197.54	+6.18	+13.4	+00	46.7	13 48 32.0
20 SU	+11	27	22	+1241	+203.66	+6.13	+13.0	+00	59.7	13 52 28.6
21 MO	+11	47	52	+1230	+209.74	+6.07	+12.6	+01	12.3	13 56 25.1
22 TU	+12	08	10	+1218	+215.75	+6.01	+12.2	+01	24.5	14 00 21.7
23 WE	+12	28	16	+1206	+221.71	+5.96	+11.7	+01	36.2	14 04 18.2
24 TH	+12	48	10	+1194	+227.60	+5.90	+11.3	+01	47.5	14 08 14.8
25 FR	+13	07	51	+1181	+233.44	+5.83	+10.8	+01	58.3	14 12 11.3
26 SA	+13	27	19	+1168	+239.21	+5.77	+10.3	+02	08.6	14 16 07.9
27 SU	+13	46	34	+1155	+244.91	+5.70	+ 9.8			14 20 04.4
28 MO	+14	05	36	+1142	+250.55	+5.64	+ 9.3			14 24 01.0
29 TU	+14	24	24	+1128	+256.12	+5.57	+ 8.8			14 27 57.6
30 WE	+14	42	57	+1113	+261.62	+5.50	+ 8.2			14 31 54.1
				+1099		+5.43	+ 7.7			

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS		MIN SEC		HR MIN SEC		
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)					
MAY 1 TH	+15 01 16		+267.04		+02 52.3		14 35 50.7		
2 FR	+15 19 20	+1084	+272.40	+5.35	+02 59.4	+ 7.1	14 39 47.2		
3 SA	+15 37 09	+1069	+277.68	+5.28	+03 06.0	+ 6.6	14 43 43.8		
4 SU	+15 54 43	+1054	+282.88	+5.20	+03 12.0	+ 6.0	14 47 40.3		
5 MO	+16 12 01	+1038	+288.00	+5.13	+03 17.4	+ 5.4	14 51 36.9		
6 TU	+16 29 02	+1022	+293.05	+5.05	+03 22.3	+ 4.9	14 55 33.4		
7 WE	+16 45 47	+1005	+298.01	+4.96	+03 26.5	+ 4.3	14 59 30.0		
8 TH	+17 02 16	+ 988	+302.89	+4.88	+03 30.3	+ 3.7	15 03 26.5		
9 FR	+17 18 27	+ 971	+307.69	+4.80	+03 33.4	+ 3.2	15 07 23.1		
10 SA	+17 34 21	+ 954	+312.40	+4.71	+03 36.0	+ 2.6	15 11 19.6		
11 SU	+17 49 58	+ 936	+317.03	+4.62	+03 38.1	+ 2.0	15 15 16.2		
12 MO	+18 05 16	+ 918	+321.56	+4.53	+03 39.5	+ 1.5	15 19 12.8		
13 TU	+18 20 16	+ 900	+326.01	+4.44	+03 40.5	+ 0.9	15 23 09.3		
14 WE	+18 34 58	+ 882	+330.36	+4.36	+03 40.8	+ 0.4	15 27 05.9		
15 TH	+18 49 21	+ 863	+334.62	+4.26	+03 40.6	- 0.2	15 31 02.4		
16 FR	+19 03 24	+ 844	+338.79	+4.17	+03 39.9	- 0.7	15 34 59.0		
17 SA	+19 17 09	+ 824	+342.86	+4.07	+03 38.6	- 1.3	15 38 55.5		
18 SU	+19 30 33	+ 805	+346.83	+3.98	+03 36.8	- 1.8	15 42 52.1		
19 MO	+19 43 38	+ 785	+350.70	+3.88	+03 34.5	- 2.4	15 46 48.6		
20 TU	+19 56 22	+ 764	+354.48	+3.77	+03 31.6	- 2.9	15 50 45.2		
21 WE	+20 08 46	+ 744	+358.15	+3.67	+03 28.1	- 3.4	15 54 41.7		
22 TH	+20 20 49	+ 723	+361.72	+3.57	+03 24.2	- 4.0	15 58 38.3		
23 FR	+20 32 32	+ 702	+365.19	+3.47	+03 19.7	- 4.5	16 02 34.9		
24 SA	+20 43 53	+ 681	+368.56	+3.36	+03 14.7	- 5.0	16 06 31.4		
25 SU	+20 54 53	+ 660	+371.82	+3.26	+03 09.2	- 5.5	16 10 28.0		
26 MO	+21 05 31	+ 638	+374.97	+3.15	+03 03.1	- 6.0	16 14 24.5		
27 TU	+21 15 47	+ 616	+378.01	+3.04	+02 56.6	- 6.5	16 18 21.1		
28 WE	+21 25 42	+ 594	+380.95	+2.93	+02 49.6	- 7.0	16 22 17.7		
29 TH	+21 35 14	+ 572	+383.77	+2.82	+02 42.1	- 7.5	16 26 14.2		
30 FR	+21 44 24	+ 550	+386.49	+2.72	+02 34.1	- 8.0	16 30 10.8		
31 SA	+21 53 11	+ 527	+389.09	+2.60	+02 25.7	- 8.4	16 34 07.3		
		+ 504		+2.49		- 8.9			

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS						
	°	' "	DAILY CHANGE (SEC)	DAILY CHANGE (MILS)	MIN	SEC	DAILY CHANGE (SEC)	HR	MIN SEC
JUN 1 SU	+22	01 36		+391.58	+02	16.8		16	38 03.9
2 MO	+22	09 37	+ 481	+393.96	+02	07.6	- 9.3	16	42 00.4
3 TU	+22	17 15	+ 458	+396.22	+01	57.9	- 9.7	16	45 57.0
4 WE	+22	24 30	+ 435	+398.37	+01	47.8	-10.1	16	49 53.5
5 TH	+22	31 22	+ 411	+400.40	+01	37.4	-10.4	16	53 50.1
6 FR	+22	37 49	+ 388	+402.32	+01	26.7	-10.7	16	57 46.6
7 SA	+22	43 53	+ 364	+404.12	+01	15.6	-11.0	17	01 43.2
8 SU	+22	49 33	+ 340	+405.80	+01	04.3	-11.3	17	05 39.8
9 MO	+22	54 50	+ 316	+407.36	+00	52.7	-11.6	17	09 36.3
10 TU	+22	59 41	+ 292	+408.80	+00	40.9	-11.8	17	13 32.9
11 WE	+23	04 09	+ 268	+410.12	+00	28.8	-12.0	17	17 29.4
12 TH	+23	08 12	+ 243	+411.32	+00	16.6	-12.2	17	21 26.0
13 FR	+23	11 51	+ 219	+412.40	+00	04.2	-12.4	17	25 22.5
14 SA	+23	15 05	+ 194	+413.36	-00	08.4	-12.5	17	29 19.1
15 SU	+23	17 55	+ 170	+414.20	-00	21.0	-12.7	17	33 15.7
16 MO	+23	20 19	+ 145	+414.91	-00	33.8	-12.8	17	37 12.2
17 TU	+23	22 19	+ 120	+415.50	-00	46.6	-12.8	17	41 08.8
18 WE	+23	23 55	+ 95	+415.97	-00	59.5	-12.9	17	45 05.3
19 TH	+23	25 05	+ 71	+416.32	-01	12.5	-12.9	17	49 01.9
20 FR	+23	25 51	+ 46	+416.55	-01	25.4	-13.0	17	52 58.4
21 SA	+23	26 12	+ 21	+416.65	-01	38.4	-13.0	17	56 55.0
22 SU	+23	26 08	- 4	+416.63	-01	51.3	-12.9	18	00 51.6
23 MO	+23	25 40	- 29	+416.49	-02	04.2	-12.9	18	04 48.1
24 TU	+23	24 46	- 53	+416.23	-02	17.0	-12.8	18	08 44.7
25 WE	+23	23 28	- 78	+415.84	-02	29.8	-12.8	18	12 41.2
26 TH	+23	21 45	- 103	+415.34	-02	42.4	-12.7	18	16 37.8
27 FR	+23	19 38	- 128	+414.71	-02	55.0	-12.5	18	20 34.3
28 SA	+23	17 06	- 152	+413.95	-03	07.4	-12.4	18	24 30.9
29 SU	+23	14 09	- 177	+413.08	-03	19.6	-12.2	18	28 27.4
30 MO	+23	10 48	- 201	+412.09	-03	31.6	-12.0	18	32 24.0
			- 225				-11.8		

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
	°	' "	DAILY CHANGE (SEC)	MILS						
JUL 1 TU	+23	07 03		+410.98	-03	43.5		18	36	20.6
2 WE	+23	02 53	- 250	+409.74	-03	55.1	-11.6	18	40	17.1
3 TH	+22	58 19	- 274	+408.39	-04	06.4	-11.3	18	44	13.7
4 FR	+22	53 21	- 298	+406.92	-04	17.4	-11.0	18	48	10.2
5 SA	+22	47 59	- 322	+405.33	-04	28.2	-10.7	18	52	06.8
6 SU	+22	42 14	- 346	+403.62	-04	38.6	-10.4	18	56	03.4
7 MO	+22	36 05	- 369	+401.80	-04	48.6	-10.0	18	59	59.9
8 TU	+22	29 32	- 393	+399.86	-04	58.2	- 9.7	19	03	56.5
9 WE	+22	22 36	- 416	+397.81	-05	07.5	- 9.2	19	07	53.0
10 TH	+22	15 17	- 439	+395.64	-05	16.3	- 8.8	19	11	49.6
11 FR	+22	07 35	- 462	+393.36	-05	24.7	- 8.4	19	15	46.1
12 SA	+21	59 30	- 485	+390.96	-05	32.6	- 7.9	19	19	42.7
13 SU	+21	51 03	- 507	+388.46	-05	40.1	- 7.4	19	23	39.2
14 MO	+21	42 13	- 530	+385.84	-05	47.0	- 7.0	19	27	35.8
15 TU	+21	33 01	- 552	+383.11	-05	53.5	- 6.4	19	31	32.3
16 WE	+21	23 26	- 574	+380.28	-05	59.4	- 5.9	19	35	28.9
17 TH	+21	13 31	- 596	+377.34	-06	04.8	- 5.4	19	39	25.5
18 FR	+21	03 13	- 617	+374.29	-06	09.7	- 4.9	19	43	22.0
19 SA	+20	52 34	- 639	+371.13	-06	14.0	- 4.3	19	47	18.6
20 SU	+20	41 34	- 660	+367.87	-06	17.8	- 3.8	19	51	15.1
21 MO	+20	30 14	- 681	+364.51	-06	21.0	- 3.2	19	55	11.7
22 TU	+20	18 32	- 701	+361.05	-06	23.6	- 2.6	19	59	08.3
23 WE	+20	06 30	- 722	+357.48	-06	25.7	- 2.1	20	03	04.8
24 TH	+19	54 08	- 742	+353.82	-06	27.2	- 1.5	20	07	01.4
25 FR	+19	41 26	- 762	+350.06	-06	28.2	- 1.0	20	10	57.9
26 SA	+19	28 25	- 782	+346.20	-06	28.6	- 0.4	20	14	54.5
27 SU	+19	15 04	- 801	+342.24	-06	28.4	+ 0.2	20	18	51.0
28 MO	+19	01 23	- 820	+338.19	-06	27.6	+ 0.8	20	22	47.6
29 TU	+18	47 24	- 839	+334.05	-06	26.3	+ 1.4	20	26	44.1
30 WE	+18	33 07	- 858	+329.81	-06	24.3	+ 1.9	20	30	40.7
31 TH	+18	18 31	- 876	+325.48	-06	21.8	+ 2.5	20	34	37.2
			- 894				+ 3.1			

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME			
	DEGREES		MILS							
	° ' "	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)						
					MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC
AUG 1 FR	+18 03 37	- 912	+321.07	-4.50	-06	18.7	+ 3.7	20	38	33.8
2 SA	+17 48 25	- 929	+316.57	-4.59	-06	14.9	+ 4.3	20	42	30.4
3 SU	+17 32 56	- 946	+311.98	-4.67	-06	10.6	+ 4.9	20	46	26.9
4 MO	+17 17 10	- 963	+307.31	-4.76	-06	05.7	+ 5.5	20	50	23.5
5 TU	+17 01 07	- 979	+302.55	-4.83	-06	00.1	+ 6.1	20	54	20.0
6 WE	+16 44 47	- 996	+297.72	-4.92	-05	54.0	+ 6.7	20	58	16.6
7 TH	+16 28 12	-1011	+292.80	-4.99	-05	47.3	+ 7.3	21	02	13.1
8 FR	+16 11 20	-1027	+287.80	-5.07	-05	39.9	+ 7.9	21	06	09.7
9 SA	+15 54 13	-1042	+282.73	-5.15	-05	32.0	+ 8.5	21	10	06.2
10 SU	+15 36 51	-1057	+277.58	-5.22	-05	23.4	+ 9.1	21	14	02.8
11 MO	+15 19 14	-1072	+272.36	-5.29	-05	14.3	+ 9.7	21	17	59.3
12 TU	+15 01 22	-1086	+267.07	-5.36	-05	04.6	+10.3	21	21	55.9
13 WE	+14 43 15	-1100	+261.71	-5.43	-04	54.3	+10.9	21	25	52.4
14 TH	+14 24 55	-1114	+256.27	-5.50	-04	43.4	+11.4	21	29	49.0
15 FR	+14 06 21	-1127	+250.77	-5.57	-04	32.0	+12.0	21	33	45.6
16 SA	+13 47 34	-1140	+245.20	-5.63	-04	20.0	+12.5	21	37	42.1
17 SU	+13 28 34	-1153	+239.57	-5.69	-04	07.5	+13.0	21	41	38.7
18 MO	+13 09 20	-1166	+233.88	-5.76	-03	54.4	+13.5	21	45	35.2
19 TU	+12 49 55	-1178	+228.12	-5.82	-03	40.9	+14.0	21	49	31.8
20 WE	+12 30 17	-1190	+222.31	-5.88	-03	26.9	+14.5	21	53	28.3
21 TH	+12 10 27	-1201	+216.43	-5.93	-03	12.4	+14.9	21	57	24.9
22 FR	+11 50 26	-1213	+210.50	-5.99	-02	57.4	+15.4	22	01	21.4
23 SA	+11 30 13	-1224	+204.51	-6.04	-02	42.0	+15.8	22	05	18.0
24 SU	+11 09 49	-1234	+198.47	-6.09	-02	26.2	+16.2	22	09	14.5
25 MO	+10 49 15	-1245	+192.37	-6.15	-02	10.0	+16.6	22	13	11.1
26 TU	+10 28 30	-1255	+186.22	-6.20	-01	53.4	+17.0	22	17	07.6
27 WE	+10 07 35	-1265	+180.03	-6.25	-01	36.4	+17.3	22	21	04.2
28 TH	+ 9 46 31	-1274	+173.78	-6.29	-01	19.1	+17.7	22	25	00.8
29 FR	+ 9 25 17	-1283	+167.49	-6.34	-01	01.4	+18.0	22	28	57.3
30 SA	+ 9 03 54	-1292	+161.16	-6.38	-00	43.3	+18.4	22	32	53.9
31 SU	+ 8 42 22	-1300	+154.78	-6.42	-00	25.0	+18.7	22	36	50.4

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS						
	°	' "	DAILY CHANGE (SEC)	DAILY CHANGE (MILS)	MIN	SEC	DAILY CHANGE (SEC)	HR	MIN SEC
SEP 1 MO	+ 8	20 42		+148.36	-00	06.3		22	40 47.0
2 TU	+ 7	58 54	-1308	-6.46	+00	12.7	+19.0	22	44 43.5
3 WE	+ 7	36 58	-1316	-6.50	+00	31.9	+19.3	22	48 40.1
4 TH	+ 7	14 55	-1323	-6.53	+00	51.4	+19.5	22	52 36.6
5 FR	+ 6	52 45	-1330	-6.57	+01	11.2	+19.8	22	56 33.2
6 SA	+ 6	30 28	-1337	-6.60	+01	31.2	+20.0	23	00 29.7
7 SU	+ 6	08 05	-1343	-6.63	+01	51.5	+20.2	23	04 26.3
8 MO	+ 5	45 36	-1349	-6.66	+02	11.9	+20.5	23	08 22.8
9 TU	+ 5	23 01	-1355	-6.69	+02	32.6	+20.6	23	12 19.4
10 WE	+ 5	00 20	-1360	-6.72	+02	53.4	+20.8	23	16 15.9
11 TH	+ 4	37 35	-1365	-6.74	+03	14.4	+21.0	23	20 12.5
12 FR	+ 4	14 45	-1370	-6.77	+03	35.5	+21.1	23	24 09.0
13 SA	+ 3	51 50	-1374	-6.79	+03	56.8	+21.2	23	28 05.6
14 SU	+ 3	28 52	-1378	-6.80	+04	18.1	+21.3	23	32 02.1
15 MO	+ 3	05 50	-1382	-6.82	+04	39.5	+21.4	23	35 58.7
16 TU	+ 2	42 44	-1386	-6.84	+05	01.0	+21.5	23	39 55.2
17 WE	+ 2	19 35	-1389	-6.86	+05	22.4	+21.5	23	43 51.8
18 TH	+ 1	56 24	-1392	-6.87	+05	43.9	+21.5	23	47 48.3
19 FR	+ 1	33 10	-1394	-6.88	+06	05.4	+21.5	23	51 44.9
20 SA	+ 1	09 54	-1396	-6.89	+06	26.8	+21.4	23	55 41.4
21 SU	+ 0	46 36	-1398	-6.90	+06	48.1	+21.3	23	59 38.0
22 MO	+ 0	23 16	-1400	-6.91	+07	09.4	+21.2	0	03 34.5
23 TU	- 0	00 05	-1401	-6.92	+07	30.5	+21.1	0	07 31.1
24 WE	- 0	23 27	-1402	-6.92	+07	51.5	+21.0	0	11 27.7
25 TH	- 0	46 49	-1402	-6.92	+08	12.3	+20.8	0	15 24.2
26 FR	- 1	10 11	-1402	-6.92	+08	32.9	+20.6	0	19 20.8
27 SA	- 1	33 33	-1402	-6.92	+08	53.4	+20.4	0	23 17.3
28 SU	- 1	56 55	-1402	-6.92	+09	13.6	+20.2	0	27 13.9
29 MO	- 2	20 16	-1401	-6.92	+09	33.6	+20.0	0	31 10.4
30 TU	- 2	43 35	-1400	-6.91	+09	53.4	+19.7	0	35 07.0
			-1398	-6.90			+19.5		

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME			SIDEREAL TIME		
	DEGREES		MILS				DAILY CHANGE (SEC)			
	°	'	''	DAILY CHANGE (SEC)	MILS	DAILY CHANGE (MILS)		MIN	SEC	HR MIN SEC
OCT 1 WE	- 3	06	53	-1396	- 55.37	-6.89	+10 12.8			0 39 03.5
2 TH	- 3	30	09	-1394	- 62.27	-6.88	+10 32.0			0 43 00.1
3 FR	- 3	53	23	-1391	- 69.15	-6.87	+10 50.9			0 46 56.6
4 SA	- 4	16	34	-1388	- 76.02	-6.85	+11 09.5			0 50 53.2
5 SU	- 4	39	41	-1384	- 82.87	-6.83	+11 27.7			0 54 49.7
6 MO	- 5	02	46	-1381	- 89.71	-6.82	+11 45.6			0 58 46.3
7 TU	- 5	25	46	-1376	- 96.53	-6.80	+12 03.1			1 02 42.8
8 WE	- 5	48	43	-1372	-103.32	-6.78	+12 20.2			1 06 39.4
9 TH	- 6	11	34	-1367	-110.10	-6.75	+12 36.9			1 10 35.9
10 FR	- 6	34	21	-1361	-116.85	-6.72	+12 53.2			1 14 32.5
11 SA	- 6	57	03	-1356	-123.57	-6.70	+13 09.1			1 18 29.0
12 SU	- 7	19	38	-1350	-130.26	-6.67	+13 24.5			1 22 25.6
13 MO	- 7	42	08	-1343	-136.93	-6.63	+13 39.4			1 26 22.1
14 TU	- 8	04	31	-1336	-143.56	-6.60	+13 53.7			1 30 18.7
15 WE	- 8	26	48	-1329	-150.16	-6.56	+14 07.6			1 34 15.2
16 TH	- 8	48	57	-1322	-156.72	-6.53	+14 20.9			1 38 11.8
17 FR	- 9	10	58	-1314	-163.25	-6.49	+14 33.7			1 42 08.3
18 SA	- 9	32	52	-1306	-169.74	-6.45	+14 45.8			1 46 04.9
19 SU	- 9	54	38	-1297	-176.19	-6.40	+14 57.4			1 50 01.4
20 MO	-10	16	15	-1288	-182.59	-6.36	+15 08.3			1 53 58.0
21 TU	-10	37	43	-1279	-188.95	-6.32	+15 18.5			1 57 54.6
22 WE	-10	59	01	-1269	-195.27	-6.27	+15 28.1			2 01 51.1
23 TH	-11	20	10	-1259	-201.53	-6.22	+15 37.0			2 05 47.7
24 FR	-11	41	09	-1248	-207.75	-6.16	+15 45.1			2 09 44.2
25 SA	-12	01	57	-1237	-213.91	-6.11	+15 52.6			2 13 40.8
26 SU	-12	22	34	-1226	-220.02	-6.05	+15 59.3			2 17 37.3
27 MO	-12	43	00	-1214	-226.07	-6.00	+16 05.3			2 21 33.9
28 TU	-13	03	14	-1202	-232.07	-5.94	+16 10.5			2 25 30.4
29 WE	-13	23	16	-1189	-238.00	-5.87	+16 15.0			2 29 27.0
30 TH	-13	43	05	-1176	-243.88	-5.81	+16 18.7			2 33 23.5
31 FR	-14	02	41	-1163	-249.68	-5.74	+16 21.6			2 37 20.1

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME		
	DEGREES		MILS						
	°	' "	DAILY CHANGE (SEC)	DAILY CHANGE (MILS)	MIN	SEC	DAILY CHANGE (SEC)	HR	MIN SEC
NOV 1 SA	-14	22 04	-1149	-255.43	+16	23.7	+ 1.3	2	41 16.6
2 SU	-14	41 13	-1135	-261.10	+16	25.1	+ 0.5	2	45 13.2
3 MO	-15	00 07	-1120	-266.70	+16	25.6	- 0.3	2	49 09.7
4 TU	-15	18 47	-1105	-272.23	+16	25.3	- 1.1	2	53 06.3
5 WE	-15	37 12	-1089	-277.69	+16	24.2	- 1.9	2	57 02.9
6 TH	-15	55 22	-1073	-283.07	+16	22.3	- 2.7	3	00 59.4
7 FR	-16	13 15	-1057	-288.37	+16	19.6	- 3.5	3	04 56.0
8 SA	-16	30 52	-1040	-293.59	+16	16.1	- 4.3	3	08 52.5
9 SU	-16	48 13	-1023	-298.73	+16	11.8	- 5.2	3	12 49.1
10 MO	-17	05 16	-1006	-303.78	+16	06.6	- 6.0	3	16 45.6
11 TU	-17	22 02	- 988	-308.75	+16	00.6	- 6.8	3	20 42.2
12 WE	-17	38 29	- 969	-313.63	+15	53.8	- 7.7	3	24 38.7
13 TH	-17	54 39	- 951	-318.41	+15	46.1	- 8.5	3	28 35.3
14 FR	-18	10 29	- 932	-323.11	+15	37.6	- 9.4	3	32 31.8
15 SA	-18	26 01	- 912	-327.71	+15	28.2	-10.2	3	36 28.4
16 SU	-18	41 13	- 892	-332.21	+15	18.0	-11.0	3	40 25.0
17 MO	-18	56 05	- 872	-336.62	+15	07.0	-11.9	3	44 21.5
18 TU	-19	10 37	- 851	-340.92	+14	55.1	-12.7	3	48 18.1
19 WE	-19	24 49	- 831	-345.13	+14	42.3	-13.6	3	52 14.6
20 TH	-19	38 39	- 809	-349.23	+14	28.8	-14.4	3	56 11.2
21 FR	-19	52 08	- 788	-353.23	+14	14.4	-15.2	4	00 07.8
22 SA	-20	05 16	- 766	-357.12	+13	59.1	-16.0	4	04 04.3
23 SU	-20	18 02	- 743	-360.90	+13	43.1	-16.8	4	08 00.9
24 MO	-20	30 25	- 720	-364.57	+13	26.2	-17.6	4	11 57.4
25 TU	-20	42 25	- 697	-368.12	+13	08.6	-18.4	4	15 54.0
26 WE	-20	54 02	- 674	-371.57	+12	50.2	-19.2	4	19 50.5
27 TH	-21	05 16	- 650	-374.90	+12	31.0	-19.9	4	23 47.1
28 FR	-21	16 07	- 626	-378.11	+12	11.1	-20.6	4	27 43.6
29 SA	-21	26 33	- 602	-381.20	+11	50.5	-21.3	4	31 40.2
30 SU	-21	36 35	- 577	-384.17	+11	29.2	-22.0	4	35 36.7

Table 2e. Sun, 1997, for zero hours universal time (GMT) - continued

GREENWICH DATE	APPARENT DECLINATION				EQUATION OF TIME		SIDEREAL TIME					
	DEGREES		DAILY CHANGE (SEC)	MILS		MIN	SEC	DAILY CHANGE (SEC)	HR	MIN	SEC	
	°	'		''	MILS							DAILY CHANGE (MILS)
DEC 1 MO	-21	46	12		-387.02		+11	07.2		4	39	33.3
2 TU	-21	55	24	- 552	-389.75	-2.73	+10	44.5	-22.6	4	43	29.9
3 WE	-22	04	11	- 527	-392.35	-2.60	+10	21.3	-23.3	4	47	26.4
4 TH	-22	12	32	- 501	-394.83	-2.47	+09	57.4	-23.8	4	51	23.0
5 FR	-22	20	28	- 476	-397.17	-2.35	+09	33.0	-24.4	4	55	19.5
6 SA	-22	27	57	- 450	-399.39	-2.22	+09	08.1	-25.0	4	59	16.1
7 SU	-22	35	01	- 423	-401.49	-2.09	+08	42.6	-25.5	5	03	12.7
8 MO	-22	41	37	- 397	-403.44	-1.96	+08	16.7	-25.9	5	07	09.2
9 TU	-22	47	47	- 370	-405.27	-1.83	+07	50.3	-26.4	5	11	05.8
10 WE	-22	53	30	- 343	-406.97	-1.69	+07	23.4	-26.8	5	15	02.3
11 TH	-22	58	46	- 316	-408.52	-1.56	+06	56.2	-27.2	5	18	58.9
12 FR	-23	03	35	- 289	-409.95	-1.43	+06	28.6	-27.6	5	22	55.4
13 SA	-23	07	56	- 261	-411.24	-1.29	+06	00.7	-28.0	5	26	52.0
14 SU	-23	11	50	- 234	-412.39	-1.16	+05	32.4	-28.3	5	30	48.5
15 MO	-23	15	15	- 206	-413.41	-1.02	+05	03.8	-28.6	5	34	45.1
16 TU	-23	18	14	- 178	-414.29	-0.88	+05	35.0	-28.8	5	38	41.7
17 WE	-23	20	44	- 150	-415.03	-0.74	+04	35.0	-29.1	5	38	41.7
18 TH	-23	22	46	- 122	-415.63	-0.60	+04	05.9	-29.3	5	42	38.2
19 FR	-23	22	46	- 94	-415.63	-0.60	+03	36.6	-29.3	5	46	34.8
20 SA	-23	24	20	- 66	-416.10	-0.46	+03	07.1	-29.5	5	50	31.3
21 SU	-23	24	20	- 38	-416.42	-0.33	+03	07.1	-29.6	5	50	31.3
22 MO	-23	25	26	- 9	-416.61	-0.19	+02	37.5	-29.7	5	54	27.9
23 TU	-23	26	03	- 9	-416.61	-0.19	+02	07.7	-29.7	5	58	24.5
24 WE	-23	26	13	+ 19	-416.66	+0.09	+01	37.9	-29.8	6	02	21.0
25 TH	-23	25	54	+ 47	-416.56	+0.23	+01	08.0	-29.9	6	06	17.6
26 FR	-23	25	07	+ 75	-416.33	+0.37	+00	38.1	-29.9	6	10	14.1
27 SA	-23	23	52	+ 104	-415.96	+0.51	+00	08.3	-29.8	6	14	10.7
28 SU	-23	22	08	+ 132	-415.45	+0.65	-00	21.5	-29.7	6	18	07.2
29 MO	-23	19	56	+ 160	-414.80	+0.79	-00	51.2	-29.6	6	22	03.8
30 TU	-23	17	17	+ 188	-414.01	+0.93	-01	20.8	-29.4	6	26	00.3
31 WE	-23	14	09	+ 216	-413.08	+1.07	-01	50.3	-29.2	6	29	56.9
32 TH	-23	10	33	+ 244	-412.02	+1.20	-02	19.5	-29.0	6	33	53.5
	-23	06	30	+ 271	-410.81	+1.34	-02	48.4	-29.0	6	37	50.0
	-23	01	58		-409.47		-03	17.1	-28.7	6	41	46.6

Table 6a. Grid convergence nomograph

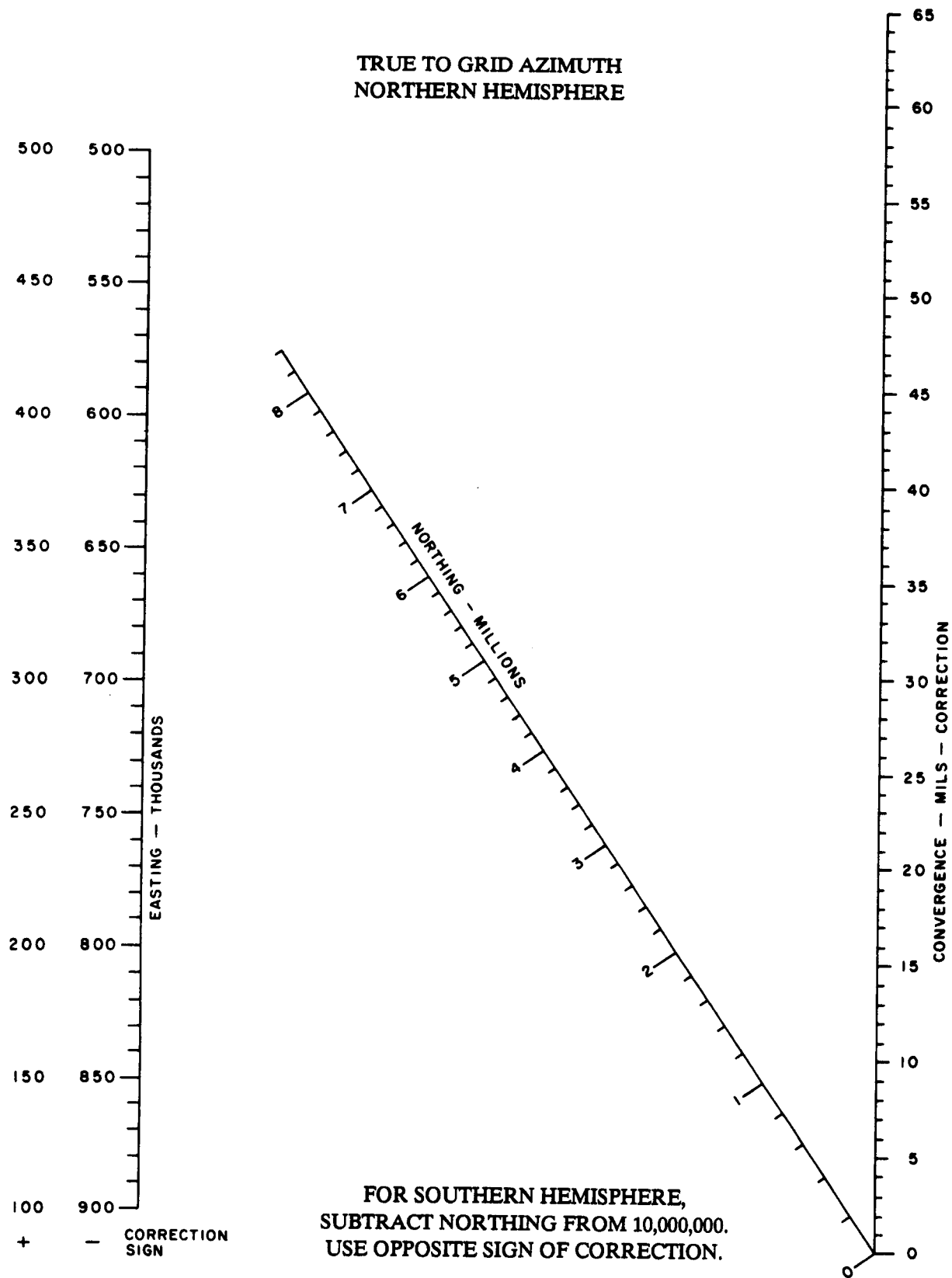


Table 9. Alphabetical star list

STAR	CONSTELLATION	NUMBER	MAGNITUDE
Acamar, Theta (θ) Eridani	Eridanus	12	3.4
Achernar, Alpha (α) Eridani	Eridanus	9	0.6
Acrux, Alpha (α) Crucis	Crux	42	1.0
Adhara, Epsilon (ϵ) Canis Majoris	Canis Major	26	1.6
Aldebaran, Alpha (α) Tauri	Taurus	15	1.1
Alhena, Gamma (γ) Geminorum*	Gemini	24	1.9
Alioth, Epsilon (ϵ) Ursae Majoris	Ursa Major	45	1.7
Alkaid (Benetnasch), Eta (η) Ursae Majoris	Ursa Major	48	1.9
Al Na'ir, Alpha (α) Grus	Grus	71	2.2
Alnilam, Epsilon (ϵ) Orionis	Orion	20	1.7
Alnitak, Zeta (ζ) Orionis*	Orion	21	2.0
Alpha (α) Ceti, Menkar**	Cetus	13	2.8
Alpha (α) Persei, Mirfak	Perseus	14	1.9
Alpha (α) Tri Aust, Atria	Triangulum Australe	58	1.9
Alphard, Alpha (α) Hydrae	Hydra	35	2.2
Alphecca, Alpha (α) Coronae Bor	Corona Borealis	55	2.3
Alpheratz, Alpha (α) Andromedae	Andromeda	1	2.1
(Al Suhail) Suhail, Lambda (λ) Velorum	Vela (Argo)	33	2.2
Altair, Alpha (α) Aquilae	Aquila	66	0.9
Ankaa, Alpha (α) Phoenix**	Phoenix	4	2.4
Antares, Alpha (α) Scorpii	Scorpius	57	1.2
Acturus, Alpha (α) Bootis	Bootes	51	0.2
Atria, Alpha (α) Tri Aust	Triangulum Australe	58	1.9
Avior, Epsilon (ϵ) Carinae	Carina (Argo, Vela)	32	1.7
Bellatrix, Gamma (γ) Orionis	Orion	18	1.7
Beta (β) Centauri, Hadar	Centaurus	49	0.9
Beta (β) Crucis, Mimosa*	Crux	44	1.5
Beta (β) Hydus	Hydra	3	2.9
Betelgeuse (Betelgeux), Alpha (α) Orionis	Orion	22	0.1
Canopus, Alpha (α) Carinae	Carina (Argo, Vela)	23	-0.9
Capella, Alpha (α) Aurigae	Auriga	17	0.2
Caph, Beta (β) Cassiopeiae*	Cassiopeia	2	2.4
Castor, Alpha (α) Geminorum*	Gemini	28	1.6
Delta (δ) Canis Majoris, Wezen*	Canis Major	27	2.0
Deneb, Alpha (α) Cygni	Cygnus	68	1.3
Denebola, Beta (β) Leonis	Leo	39	2.2
Diphda (Deneb Kaitos), Beta (β) Ceti	Cetus	6	2.2
Dschubba, Delta (δ) Scorpii**	Scorpius	56	2.5
Dubhe, Alpha (α) Ursae Majoris	Ursa Major	38	1.9
Elnath (El Nath), Beta (β) Tauri	Taurus	19	1.8
Eltanin (Eltamin), Gamma (γ) Draconis	Draco	62	2.4
Enif, Epsilon (ϵ) Pegasi	Pegasus	70	2.5
Epsilon (ϵ) Carinae, Avior	Carina (Argo, Vela)	32	1.7
Fomalhaut, Alpha (α) Piscis Austrini	Piscis Austrinus	72	1.3
Gacrux, Gamma (γ) Crucis	Crux	43	1.6
Gamma (γ) Cassiopeiae*	Cassiopeia	7	1.6-2.8
Gamma (γ) Velorum (Gamma Argus)*	Vela (Argo)	31	1.9
Gamma (γ) Geminorum, Alhena*	Gemini	24	1.9
Gienah, Gamma (γ) Corvi**	Corvus	41	2.8
Hadar, Beta (β) Centauri	Centaurus	49	0.9
Hamal, Alpha (α) Arietis	Aries	11	2.2
Kaus Australis, Epsilon (ϵ) Sagittarii	Sagittarius	63	1.9

Table 9. Alphabetical star list - continued

STAR	CONSTELLATION	NUMBER	MAGNITUDE
Kochab, Beta (β) Ursae Minoris	Ursa Minor	54	2.2
Markab, Alpha (α) Pegasi	Pegasus	73	2.6
Menkar, Alpha (α) Ceti**	Cetus	13	2.8
Menkent, Theta (θ) Centauri	Centaurus	50	2.3
Merak, Beta (β) Ursae Majoris*	Ursa Major	37	2.4
Misplacidus, Beta (β) Carinae	Carina (Argo)	34	1.8
Mimosa, Beta (β) Crucis*	Crux	44	1.5
Mirfak (Marfak), Alpha (α) Persei	Perseus	14	1.9
Mizar, Zeta (ζ) Ursae Majoris*	Ursa Major	46	2.4
Nunki, Sigma (σ) Sagittarii	Sagittarius	65	2.1
(Octantis) Nu (ν) Octantis***	Octans	69	3.7
Peacock, Alpha (α) Pavonis	Pavo	67	2.1
Phecda, Gamma (γ) Ursae Majoris*	Ursa Major	40	2.5
Polaris, Alpha (α) Ursae Minoris***	Ursa Minor	10	2.1
Pollux, Beta (β) Geminorum	Gemini	30	1.2
Procyon, Alpha (α) Canis Minoris	Canis Minor	29	0.5
Rasalhague, Alpha (α) Ophiuchi	Ophiuchus	61	2.1
Regulus, Alpha (α) Leonis	Leo	36	1.3
Rigel, Beta (β) Orionis	Orion	16	0.3
Rigil Kentaurus, Alpha (α) Centauri	Centaurus	52	0.1
Ruchbah, Delta (δ) Cassiopeiae*	Cassiopeia	8	2.8
Sabik, Eta (η) Ophiuchi	Ophiuchus	59	2.6
Scaula (Shaula), Lambda (λ) Scorpii	Scorpius	60	1.7
Schedar (Schedir), Alpha (α) Cassiopeiae	Cassiopeia	5	2.3
Sirius, Alpha (α) Canis Majoris	Canis Major	25	-1.6
Spica, Alpha (α) Virginis	Virgo	47	1.2
Suhail (Al Suhail), Lambda (λ) Velorum	Vela (Argo)	33	2.2
Theta (θ) Centauri, Menkent	Centaurus	50	2.3
Vega, Alpha (α) Lyrae	Lyra	64	0.1
Wezen, Delta (δ) Canis Majoris*	Canis Major	27	2.0
Zeta (ζ) Orionis, Alnitak*	Orion	21	2.0
Zubenelgenubi, Alpha (α) Librae**	Libra	53	2.9

Note. Sirius (magnitude -1.6) is the brightest star listed. Octantis (magnitude -3.7) is the dimmest star listed. Brightness of other stars listed is indicated by their magnitude.

Spelled out names in parentheses are names sometimes used but not recommended.

*Indicates star not on Identifier 2012D.

**Indicates star not on Identifier 2012C.

***Indicates star not on either Identifier.

The constellation Argus has been replaced by its three modern divisions Carina, Puppis, and Vela.

Table 10a(1). Apparent places of stars, 1993 (degrees)

Star No.	Right Ascen- sion (Hr Min) Declina- tion (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
1	RA DEC	00 08 29 03	2.4 22	2.0 18	1.8 14	1.9 09	2.4 08	3.3 09	4.4 14	5.4 22	6.0 29	6.3 36	6.2 40	6.0 42	5.5 41
2	RA DEC	00 08 59 06	49.0 64	48.1 60	47.6 53	47.7 45	48.5 39	49.8 37	51.4 40	52.9 48	53.9 57	54.2 67	54.0 76	53.4 82	52.5 83
3	RA DEC	00 25 -77 17	23.3 51	20.7 46	19.2 37	18.8 26	19.8 15	22.1 06	25.0 01	28.1 01	30.5 07	31.3 16	30.4 25	28.2 31	25.5 32
4	RA DEC	00 25 -42 20	57.1 47	56.6 45	56.2 40	56.2 32	56.7 23	57.5 14	58.6 08	59.8 05	60.6 07	61.0 13	60.8 20	60.4 26	59.8 28
5	RA DEC	00 40 56 29	7.8 80	6.9 77	6.4 71	6.3 63	6.9 57	8.0 54	9.5 56	11.0 63	12.1 72	12.6 81	12.6 90	12.2 96	11.4 98
6	RA DEC	00 43 -18 01	15.3 31	14.9 32	14.7 31	14.7 26	15.0 20	15.7 13	16.7 07	17.6 02	18.4 00	18.7 02	18.7 06	18.5 10	18.2 13
7	RA DEC	00 56 60 40	18.6 68	17.6 65	16.8 60	16.6 52	17.2 45	18.5 41	20.1 43	21.7 48	23.0 57	23.7 67	23.8 76	23.4 83	22.5 86
8	RA DEC	01 25 60 11	23.3 79	22.3 78	21.5 73	21.2 66	21.5 59	22.7 54	24.2 54	25.9 59	27.3 67	28.2 76	28.5 85	28.2 92	27.5 96
9	RA DEC	01 37 -57 15	28.5 92	27.4 92	26.6 87	26.1 78	26.2 67	26.9 57	28.1 49	29.5 45	30.8 47	31.5 53	31.7 63	31.2 71	30.4 75
10	See Table 11a. Apparent places of Polaris, 1993														
11	RA DEC	02 06 23 25	48.4 58	48.0 56	47.6 53	47.4 51	47.5 49	48.1 49	49.0 52	50.0 57	50.9 63	51.6 67	51.9 70	52.0 72	51.8 72
12	RA DEC	02 57 -40 19	61.5 66	60.9 69	60.2 68	59.6 63	59.4 55	59.7 45	60.5 36	61.5 30	62.6 28	63.4 31	63.9 39	63.9 47	63.6 54
13	RA DEC	03 01 04 03	56.7 48	56.3 46	55.9 45	55.6 45	55.5 46	55.9 50	56.6 54	57.5 59	58.4 63	59.1 65	59.6 64	59.8 62	59.7 60
14	RA DEC	03 23 49 50	52.2 26	51.6 28	50.9 27	50.3 22	50.1 17	50.5 12	51.5 09	52.9 10	54.2 14	55.3 19	56.2 25	56.6 31	56.5 36
15	RA DEC	04 35 16 29	33.5 47	33.3 45	32.9 45	32.4 44	32.1 43	32.2 44	32.8 45	33.6 48	34.6 51	35.4 52	36.2 52	36.7 51	36.9 51
16	RA DEC	05 14 -08 12	14.4 37	14.2 41	13.8 44	13.2 44	12.9 41	12.8 37	13.2 32	13.9 26	14.7 23	15.6 22	16.3 25	16.9 30	17.2 36
17	RA DEC	05 16 45 59	13.7 33	13.5 37	12.9 38	12.2 37	11.6 33	11.6 29	12.2 25	13.2 22	14.4 22	15.6 23	16.8 25	17.6 29	18.0 33
18	RA DEC	05 24 06 20	47.7 36	47.6 33	47.3 32	46.7 32	46.4 32	46.3 34	46.7 37	47.4 40	48.3 43	49.1 44	49.9 42	50.5 39	50.9 36
19	RA DEC	05 25 28 36	53.7 08	53.7 09	53.2 09	52.6 09	52.2 07	52.2 05	52.6 04	53.4 04	54.4 05	55.4 06	56.3 06	57.1 07	57.5 08
20	RA DEC	05 35 -01 12	53.9 24	53.8 28	53.4 30	52.9 31	52.5 29	52.4 26	52.7 22	53.4 18	54.2 15	55.0 14	55.8 17	56.5 21	56.8 25
21	RA DEC	05 40 -01 56	26.7 49	26.6 53	26.2 55	25.7 55	25.3 54	25.2 51	25.5 47	26.1 42	27.0 39	27.8 38	28.6 41	29.3 45	29.6 50
22	RA DEC	05 54 07 24	50.0 19	50.0 17	49.7 16	49.2 15	48.7 16	48.6 17	48.9 20	49.6 23	50.4 25	51.2 25	52.1 23	52.8 20	53.2 17
23	RA DEC	06 23 -52 41	50.5 35	50.2 45	49.5 51	48.4 53	47.4 50	46.8 43	46.7 34	47.2 24	48.2 17	49.3 15	50.6 20	51.5 28	51.9 40
24	RA DEC	06 37 16 24	21.1 16	21.2 15	20.9 15	20.4 15	19.9 15	19.7 15	19.9 16	20.5 17	21.2 17	22.1 17	23.0 15	23.9 12	24.5 10
25	RA DEC	06 44 -16 42	52.8 27	52.8 34	52.5 38	51.9 39	51.4 38	51.1 34	51.2 28	51.6 22	52.3 18	53.2 17	54.1 20	54.8 27	55.3 35

Table 10a(1). Apparent places of stars, 1993 (degrees) - continued

Star No.	Right Ascension (Hr Min) Declination (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
26	RA DEC	06 58 -28 57	23.4 48	23.5 57	23.1 62	22.5 65	21.9 63	21.5 58	21.5 52	21.9 44	22.6 38	23.4 36	24.4 39	25.2 47	25.8 56
27	RA DEC	07 08 -26 22	8.8 58	8.9 67	8.6 72	8.0 75	7.4 74	7.0 69	7.0 63	7.3 56	8.0 50	8.8 48	9.8 51	10.6 58	11.2 67
28	RA DEC	07 34 31 53	12.1 67	12.4 68	12.2 70	11.7 72	11.2 73	10.8 71	10.8 69	11.3 67	12.0 64	12.9 61	13.9 58	14.9 56	15.8 56
29	RA DEC	07 38 05 14	58.6 29	58.8 25	58.7 24	58.2 23	57.8 24	57.4 25	57.5 27	57.8 29	58.4 31	59.1 30	60.0 27	60.9 22	61.6 17
30	RA DEC	07 44 28 02	56.0 28	56.4 28	56.2 30	55.8 32	55.2 32	54.8 32	54.8 30	55.2 28	55.9 26	56.7 23	57.7 20	58.7 18	59.6 16
31	RA DEC	08 09 -47 18	21.6 57	21.9 69	21.6 77	20.8 83	20.0 84	19.2 80	18.9 74	19.0 65	19.5 57	20.4 52	21.5 53	22.7 60	23.5 70
32	RA DEC	08 22 -59 29	25.3 11	25.5 23	25.1 33	24.1 40	22.9 42	21.8 39	21.1 33	21.0 24	21.6 15	22.7 09	24.1 09	25.6 15	26.6 25
33	RA DEC	09 07 -43 24	46.7 14	47.2 25	47.2 34	46.7 41	46.0 44	45.3 42	44.9 37	44.8 30	45.0 22	45.7 16	46.8 16	47.9 21	49.0 30
34	RA DEC	09 13 -69 41	11.1 13	11.8 25	11.5 35	10.3 45	8.6 49	6.8 49	5.5 44	4.9 36	5.1 26	6.3 19	8.3 17	10.4 20	12.1 29
35	RA DEC	09 27 -08 37	16.7 47	17.3 54	17.4 58	17.1 61	16.7 62	16.3 60	16.1 57	16.1 54	16.4 50	16.9 49	17.7 52	18.6 57	19.6 64
36	RA DEC	10 08 11 59	1.9 54	2.6 50	2.9 49	2.8 49	2.4 51	2.0 53	1.8 54	1.7 54	1.9 54	2.3 51	3.0 47	4.0 41	5.0 35
37	RA DEC	11 01 56 24	27.4 48	28.7 50	29.3 56	29.3 63	28.7 69	27.8 73	27.0 71	26.5 66	26.4 58	26.8 49	27.7 40	29.0 32	30.6 29
38	RA DEC	11 03 61 46	20.2 55	21.7 58	22.4 63	22.3 71	21.6 78	20.5 81	19.5 80	18.9 74	18.7 65	19.1 56	20.1 46	21.6 38	23.4 35
39	RA DEC	11 48 14 36	43.5 27	44.4 22	45.0 21	45.2 22	45.0 25	44.7 28	44.4 30	44.1 30	44.0 29	44.1 26	44.6 20	45.4 14	46.4 07
40	RA DEC	11 53 53 43	29.3 37	30.6 37	31.4 41	31.6 48	31.3 56	30.5 61	29.8 61	29.1 58	28.8 51	28.8 42	29.4 32	30.5 23	32.0 18
41	RA DEC	12 15 -17 30	28.0 13	28.9 20	29.5 26	29.8 31	29.8 33	29.6 34	29.2 32	28.9 30	28.7 26	28.7 24	29.2 23	30.0 26	31.0 32
42	RA DEC	12 26 -63 03	13.9 26	15.6 33	16.7 42	17.2 53	17.0 62	16.4 69	15.4 71	14.4 68	13.6 61	13.4 53	14.2 46	15.6 43	17.5 45
43	RA DEC	12 30 -57 04	47.9 17	49.4 24	50.4 33	50.9 43	50.8 52	50.3 57	49.5 59	48.7 56	48.1 50	48.0 42	48.6 36	49.8 33	51.4 36
44	RA DEC	12 47 -59 38	19.8 51	21.5 58	22.6 66	23.2 77	23.2 86	22.7 92	22.0 94	21.1 92	20.3 86	20.0 79	20.6 71	21.8 68	23.6 70
45	RA DEC	12 53 55 59	43.9 28	45.4 26	46.4 29	47.0 36	46.8 44	46.2 51	45.4 54	44.6 52	43.9 46	43.6 38	43.8 27	44.7 17	46.2 09
46	RA DEC	13 23 54 57	38.9 19	40.3 16	41.4 18	42.1 25	42.1 34	41.6 41	40.9 45	40.0 45	39.2 40	38.8 32	38.9 21	39.6 10	40.9 02
47	RA DEC	13 24 -11 07	50.3 33	51.3 39	52.0 44	52.5 47	52.7 48	52.6 48	52.4 46	52.1 45	51.7 43	51.5 41	51.7 42	52.4 45	53.4 50
48	RA DEC	13 47 49 20	16.0 32	17.3 28	18.3 29	19.0 35	19.2 43	18.9 51	18.3 55	17.5 56	16.8 52	16.3 45	16.3 35	16.9 25	18.1 16
49	RA DEC	14 03 -60 20	20.1 11	22.0 14	23.4 21	24.5 30	25.0 39	24.9 46	24.4 50	23.5 51	22.5 47	21.9 41	22.0 33	23.0 28	24.6 26
50	RA DEC	14 06 -36 20	16.8 04	18.0 08	19.0 14	19.7 21	20.1 26	20.1 30	19.9 31	19.4 31	18.9 28	18.5 23	18.6 19	19.3 17	20.4 19

Table 10a(1). Apparent places of stars, 1993 (degrees) - continued

Star No.	Right Ascension (Hr Min) Declination (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
51	RA DEC	14 15 19 12	20.9 55	21.9 49	22.7 47	23.3 48	23.6 52	23.6 58	23.3 62	22.9 64	22.5 63	22.1 60	22.1 54	22.6 47	23.4 38
52	RA DEC	14 39 -60 48	7.5 14	9.4 16	10.9 21	12.1 29	12.8 37	12.8 44	12.4 49	11.5 51	10.4 48	9.6 42	9.5 34	10.3 28	11.8 26
53	RA DEC	14 50 -16 00	29.8 47	30.8 52	31.7 56	32.5 59	32.9 61	33.1 61	33.0 60	32.7 59	32.2 57	31.9 55	31.8 55	32.2 56	33.1 60
54	RA DEC	14 50 74 10	40.1 42	42.6 37	44.9 38	46.8 44	47.5 53	46.9 63	45.3 69	43.0 72	40.6 69	38.7 61	37.6 51	37.8 40	39.4 30
55	RA DEC	15 34 26 43	23.2 66	24.2 59	25.1 57	26.0 58	26.5 64	26.7 71	26.6 77	26.2 81	25.6 82	25.1 80	24.8 74	25.0 66	25.6 57
56	RA DEC	15 59 -22 36	55.2 06	56.2 09	57.2 11	58.1 14	58.8 16	59.1 16	59.2 17	59.0 16	58.5 15	58.0 14	57.8 12	58.0 12	58.7 13
57	RA DEC	16 28 -26 24	58.6 58	59.6 60	60.6 62	61.6 64	62.3 66	62.8 67	63.0 67	62.8 68	62.4 68	61.8 66	61.5 64	61.6 63	62.2 63
58	RA DEC	16 47 -69 00	54.0 48	56.0 44	58.2 43	60.6 46	62.5 51	63.6 59	63.9 66	63.3 72	61.9 75	60.4 73	59.3 67	59.2 59	60.4 51
59	RA DEC	17 09 -15 42	58.4 59	59.3 61	60.1 63	61.1 64	61.9 64	62.5 62	62.7 61	62.7 60	62.3 59	61.7 59	61.3 58	61.3 58	61.8 60
60	RA DEC	17 33 -37 05	7.7 54	8.6 52	9.7 52	10.8 52	11.8 54	12.6 56	13.0 58	13.0 60	12.5 62	11.9 61	11.3 59	11.2 56	11.7 53
61	RA DEC	17 34 12 33	36.2 52	36.8 45	37.6 42	38.6 42	39.3 45	39.9 51	40.2 57	40.1 62	39.7 65	39.1 65	38.7 63	38.5 59	38.9 52
62	RA DEC	17 56 51 29	24.9 20	25.6 11	26.6 05	27.8 05	28.9 10	29.7 19	29.9 29	29.6 38	28.7 44	27.7 45	26.7 41	26.2 34	26.2 23
63	RA DEC	18 23 -34 23	42.1 16	42.9 14	43.8 13	44.9 12	45.9 11	46.8 12	47.4 13	47.5 15	47.2 17	46.5 17	45.9 16	45.7 14	46.0 12
64	RA DEC	18 36 38 46	41.0 38	41.5 29	42.3 24	43.4 22	44.3 26	45.1 34	45.5 44	45.5 53	45.0 59	44.2 61	43.5 60	43.0 54	43.0 45
65	RA DEC	18 54 -26 18	49.6 20	50.2 18	51.0 17	52.0 16	53.0 14	53.8 13	54.4 12	54.7 12	54.4 14	53.9 14	53.3 14	53.1 13	53.2 12
66	RA DEC	19 50 08 50	26.2 62	26.5 58	27.0 55	27.9 54	28.7 57	29.6 63	30.2 70	30.5 76	30.4 80	30.0 82	29.4 81	29.1 79	29.0 75
67	RA DEC	20 25 -56 45	5.1 32	5.4 24	6.2 17	7.5 11	9.0 07	10.5 06	11.7 08	12.4 13	12.3 19	11.6 24	10.6 26	9.8 24	9.5 18
68	RA DEC	20 41 45 15	10.7 31	10.7 22	11.1 15	12.0 10	13.1 10	14.2 16	15.1 25	15.5 36	15.4 45	14.8 52	14.0 54	13.3 52	12.8 46
69	RA DEC	21 40 -77 24	40.4 86	39.6 76	40.3 66	42.4 56	45.4 49	48.8 46	51.8 48	54.0 54	54.5 62	53.3 70	50.7 75	48.0 74	46.0 68
70	RA DEC	21 43 09 50	50.6 41	50.6 38	50.8 35	51.3 34	52.1 36	53.1 41	53.9 48	54.6 55	54.8 60	54.6 63	54.2 64	53.8 62	53.5 59
71	RA DEC	22 07 -46 59	47.6 48	47.4 43	47.6 36	48.3 28	49.3 21	50.5 16	51.7 14	52.7 15	53.1 20	52.9 25	52.3 30	51.6 32	51.1 30
72	RA DEC	22 57 -29 39	16.3 38	16.1 35	16.1 32	16.5 25	17.2 18	18.1 12	19.2 07	20.1 05	20.6 06	20.6 10	20.2 14	19.8 17	19.4 18
73	RA DEC	23 04 15 10	25.2 14	25.0 10	25.0 07	25.3 05	25.9 06	26.8 10	27.8 16	28.6 24	29.1 30	29.1 34	28.9 36	28.5 36	28.2 33

Table 10a(2). Apparent places of stars, 1994 (degrees)

Star No.	Right Ascen- sion (Hr Min) Declina- tion (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
1	RA DEC	00 08 29 03	5.5 41	5.1 37	4.9 33	5.0 28	5.5 27	6.4 28	7.4 33	8.4 40	9.0 48	9.3 54	9.2 59	8.9 60	8.5 60
2	RA DEC	00 08 59 06	52.5 83	51.6 79	51.0 72	51.1 64	51.9 58	53.2 56	54.8 59	56.2 66	57.2 76	57.6 86	57.3 95	56.7 100	55.8 101
3	RA DEC	00 25 -77 16	25.5 92	22.9 87	21.4 78	20.9 67	21.9 56	24.2 47	27.2 42	30.3 43	32.6 48	33.5 57	32.6 66	30.5 72	27.6 73
4	RA DEC	00 25 -42 19	59.8 88	59.3 87	58.9 82	58.9 74	59.3 65	60.2 56	61.3 50	62.4 47	63.2 49	63.6 55	63.5 62	63.0 68	62.4 71
5	RA DEC	00 40 56 30	11.4 38	10.5 35	9.9 29	9.8 21	10.4 15	11.6 12	13.0 14	14.5 20	15.6 29	16.1 39	16.1 48	15.6 54	14.9 56
6	RA DEC	00 43 -18 00	18.2 73	17.8 74	17.5 72	17.5 68	17.8 62	18.5 55	19.4 49	20.4 44	21.1 42	21.5 44	21.5 48	21.3 52	20.9 55
7	RA DEC	00 56 60 40	22.5 86	21.4 84	20.7 78	20.5 70	21.0 63	22.3 59	23.8 60	25.5 66	26.7 74	27.4 84	27.5 93	27.1 100	26.2 103
8	RA DEC	01 25 60 12	27.5 36	26.4 35	25.6 30	25.2 22	25.6 15	26.8 11	28.3 11	29.9 15	31.3 23	32.2 32	32.5 42	32.2 49	31.5 53
9	RA DEC	01 37 -57 15	30.4 75	29.3 75	28.5 71	28.0 62	28.0 51	28.8 41	29.9 33	31.3 29	32.6 31	33.4 37	33.5 46	33.1 55	32.2 60

10 See Table 11b. Apparent places of Polaris, 1994

11	RA 02 06 DEC 23 26	51.8 12	51.4 11	50.9 08	50.7 05	50.8 04	51.4 04	52.2 07	53.2 12	54.2 17	54.8 22	55.2 25	55.2 26	55.0 27
12	RA 02 58 DEC -40 19	3.6 54	3.0 57	2.3 56	1.7 51	1.5 43	1.8 33	2.5 25	3.5 18	4.6 16	5.4 19	5.9 27	5.9 35	5.6 42
13	RA 03 01 DEC 04 03	59.7 60	59.4 58	58.9 56	58.6 56	58.5 58	58.9 61	59.6 66	60.5 71	61.4 74	62.1 76	62.5 76	62.7 73	62.7 71
14	RA 03 23 DEC 49 50	56.5 36	55.9 38	55.2 36	54.5 32	54.4 27	54.8 22	55.7 19	57.0 20	58.4 23	59.5 29	60.3 35	60.7 41	60.7 46
15	RA 04 35 DEC 16 29	36.9 51	36.7 50	36.2 49	35.7 48	35.4 47	35.5 48	36.0 49	36.8 52	37.8 54	38.7 56	39.4 56	39.9 56	40.1 55
16	RA 05 14 DEC -08 12	17.2 36	17.0 40	16.5 42	16.0 43	15.6 40	15.6 36	15.9 31	16.6 25	17.4 22	18.3 21	19.0 24	19.6 29	19.8 35
17	RA 05 16 DEC 45 59	18.0 33	17.8 37	17.2 38	16.4 37	15.9 34	15.9 29	16.4 26	17.4 23	18.6 22	19.8 23	20.9 26	21.8 30	22.2 34
18	RA 05 24 DEC 06 20	50.9 36	50.8 33	50.4 32	49.8 32	49.4 32	49.4 34	49.7 37	50.4 41	51.3 43	52.1 44	52.9 42	53.5 39	53.9 36
19	RA 05 25 DEC 28 36	57.5 08	57.3 09	56.9 09	56.3 08	55.9 07	55.8 05	56.2 04	57.0 04	58.0 05	59.0 06	59.9 06	60.6 07	61.0 08
20	RA 05 35 DEC -01 12	56.8 25	56.7 29	56.3 31	55.8 31	55.4 30	55.3 27	55.6 23	56.2 18	57.0 15	57.9 15	58.7 17	59.3 21	59.6 26
21	RA 05 40 DEC -01 56	29.6 50	29.5 54	29.1 56	28.6 57	28.2 55	28.1 52	28.4 48	29.0 43	29.8 40	30.6 40	31.4 42	32.1 46	32.4 51
22	RA 05 54 DEC 07 24	53.2 17	53.2 14	52.8 13	52.3 13	51.8 13	51.7 15	52.0 18	52.6 20	53.4 23	54.3 23	55.1 21	55.8 18	56.2 15
23	RA 06 23 DEC -52 41	51.9 40	51.6 50	50.8 56	49.7 58	48.7 55	48.1 48	48.0 38	48.5 29	49.4 22	50.6 20	51.8 24	52.7 33	53.1 44
24	RA 06 37 DEC 16 24	24.5 10	24.5 09	24.2 09	23.7 09	23.2 09	23.0 09	23.2 10	23.7 11	24.5 11	25.4 11	26.3 09	27.1 07	27.7 04
25	RA 06 44 DEC -16 42	55.3 35	55.3 42	55.0 46	54.4 47	53.9 46	53.6 42	53.7 36	54.1 30	54.8 26	55.7 25	56.5 28	57.3 34	57.8 42

Table 10a(2). Apparent places of stars, 1994 (degrees) - continued

Star No.	Right Ascension (Hr Min) Declination (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH											
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
			Seconds (time of RA or arc of declination)											
26	RA 06 58	25.8	25.8	25.4	24.8	24.2	23.8	23.8	24.1	24.8	25.7	26.6	27.4	28.0
	DEC -28 57	56	64	70	72	71	66	59	51	46	44	46	54	63
27	RA 07 08	11.2	11.3	10.9	10.3	9.7	9.3	9.3	9.6	10.3	11.1	12.1	12.9	13.5
	DEC -26 22	67	75	81	83	82	78	71	64	58	56	59	66	75
28	RA 07 34	15.8	16.1	15.9	15.3	14.8	14.4	14.4	14.8	15.5	16.4	17.4	18.4	19.3
	DEC 31 53	56	58	60	62	62	61	59	57	54	51	49	47	46
29	RA 07 39	1.6	1.9	1.7	1.2	0.7	0.4	0.4	0.7	1.3	2.1	3.0	3.8	4.5
	DEC 05 14	17	14	12	11	12	14	16	18	19	19	16	11	06
30	RA 07 44	59.6	59.9	59.7	59.2	58.7	58.3	58.3	58.6	59.3	60.1	61.1	62.1	62.9
	DEC 28 02	16	17	19	20	21	21	19	17	15	12	10	07	06
31	RA 08 09	23.5	23.8	23.4	22.7	21.8	21.1	20.7	20.8	21.3	22.2	23.4	24.5	25.3
	DEC -47 19	10	21	30	35	37	33	26	18	09	05	06	12	22
32	RA 08 22	26.6	26.9	26.5	25.5	24.3	23.2	22.5	22.4	22.9	24.0	25.4	26.9	27.9
	DEC -59 29	25	37	46	53	55	53	46	37	28	22	22	27	38
33	RA 09 07	49.0	49.5	49.4	48.9	48.2	47.5	47.1	46.9	47.2	47.9	49.0	50.1	51.1
	DEC -43 24	30	41	50	57	60	58	53	45	37	32	31	36	45
34	RA 09 13	12.1	12.8	12.5	11.3	9.6	7.8	6.5	5.8	6.1	7.3	9.2	11.3	13.0
	DEC -69 41	29	41	51	61	65	65	60	52	42	35	32	35	45
35	RA 09 27	19.6	20.1	20.2	20.0	19.6	19.2	18.9	18.9	19.2	19.7	20.5	21.4	22.3
	DEC -08 38	04	11	15	18	18	17	14	10	07	06	08	13	20
36	RA 10 08	5.0	5.7	5.9	5.8	5.5	5.0	4.8	4.7	4.8	5.3	6.0	6.9	7.9
	DEC 11 59	35	32	31	31	33	35	36	37	36	33	29	23	18
37	RA 11 01	30.6	31.9	32.5	32.4	31.8	31.0	30.2	29.6	29.5	29.9	30.8	32.1	33.7
	DEC 56 24	29	31	36	44	50	53	52	48	39	30	21	14	10
38	RA 11 03	23.4	24.9	25.6	25.5	24.7	23.7	22.7	22.0	21.8	22.2	23.2	24.7	26.5
	DEC 61 46	35	38	44	52	59	62	61	55	47	37	27	20	17
39	RA 11 48	46.4	47.3	47.9	48.0	47.9	47.6	47.2	46.9	46.8	46.9	47.4	48.2	49.2
	DEC 14 35	67	63	61	63	65	68	71	71	70	67	61	55	48
40	RA 11 53	32.0	33.4	34.1	34.3	34.0	33.3	32.5	31.8	31.5	31.5	32.1	33.2	34.7
	DEC 53 42	78	77	82	89	96	101	102	99	92	83	73	64	59
41	RA 12 15	31.0	32.0	32.6	32.9	32.8	32.6	32.2	31.9	31.7	31.7	32.1	32.9	33.9
	DEC -17 30	32	39	45	50	52	53	51	48	45	42	42	45	51
42	RA 12 26	17.5	19.2	20.3	20.8	20.6	20.0	19.0	17.9	17.1	17.0	17.6	19.0	20.9
	DEC -63 03	45	52	61	72	81	87	89	86	80	72	64	61	63
43	RA 12 30	51.4	52.9	53.9	54.3	54.3	53.8	53.0	52.2	51.5	51.4	51.9	53.2	54.8
	DEC -57 04	36	43	52	62	70	76	78	75	69	61	54	51	54
44	RA 12 47	23.6	25.2	26.3	26.9	26.9	26.4	25.6	24.7	23.9	23.7	24.2	25.4	27.1
	DEC -59 39	10	16	25	35	44	50	52	50	44	37	29	26	27
45	RA 12 53	46.2	47.6	48.7	49.2	49.1	48.5	47.6	46.8	46.1	45.8	46.1	46.9	48.3
	DEC 55 58	69	68	71	78	86	93	96	95	89	80	69	59	52
46	RA 13 23	40.9	42.4	43.5	44.1	44.1	43.7	42.9	42.0	41.2	40.8	40.9	41.6	42.9
	DEC 54 56	62	59	61	68	77	84	88	88	83	75	64	54	46
47	RA 13 24	53.4	54.4	55.1	55.6	55.8	55.7	55.4	55.0	54.7	54.5	54.7	55.3	56.3
	DEC -11 07	50	56	61	64	65	65	63	61	59	58	58	61	66
48	RA 13 47	18.1	19.4	20.4	21.1	21.2	20.9	20.3	19.6	18.8	18.4	18.4	18.9	20.1
	DEC 49 20	16	12	13	19	27	35	40	40	37	30	20	09	00
49	RA 14 03	24.6	26.3	27.8	28.9	29.4	29.3	28.7	27.8	26.8	26.2	26.3	27.2	28.8
	DEC -60 20	26	30	36	45	53	61	65	66	62	56	48	42	41
50	RA 14 06	20.4	21.5	22.5	23.2	23.6	23.6	23.3	22.9	22.3	22.0	22.0	22.7	23.7
	DEC -36 20	19	24	29	36	41	45	47	46	43	39	34	32	34

Table 10a(2). Apparent places of stars, 1994 (degrees) - continued

Star No.	Right Ascen- sion (Hr Min) Declina- tion (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
51	RA DEC	14 15 19 12	23.4 38	24.4 32	25.2 30	25.9 32	26.1 36	26.1 41	25.9 45	25.5 48	25.0 47	24.7 44	24.6 38	25.1 31	25.9 22
52	RA DEC	14 39 -60 48	11.8 26	13.5 28	15.0 33	16.3 41	16.9 49	17.0 57	16.5 61	15.5 63	14.5 60	13.7 54	13.5 47	14.2 40	15.8 38
53	RA DEC	14 50 -16 01	33.1 00	34.1 04	34.9 08	35.7 11	36.1 13	36.3 13	36.2 12	35.9 11	35.4 09	35.0 08	35.0 07	35.3 08	36.2 11
54	RA DEC	14 50 74 10	39.4 30	41.9 24	44.3 25	46.2 32	46.9 41	46.3 51	44.7 57	42.4 60	40.1 57	38.1 50	37.1 39	37.3 28	38.9 18
55	RA DEC	15 34 26 43	25.6 57	26.6 50	27.5 47	28.3 49	28.8 55	29.1 62	28.9 68	28.5 72	28.0 73	27.4 71	27.1 65	27.3 57	27.9 48
56	RA DEC	15 59 -22 36	58.7 13	59.7 16	60.6 19	61.5 21	62.2 23	62.6 24	62.7 24	62.4 23	61.9 23	61.4 21	61.1 19	61.3 19	62.0 20
57	RA DEC	16 29 -26 25	2.2 03	3.2 05	4.1 07	5.1 09	5.9 10	6.4 12	6.5 12	6.3 13	5.9 12	5.3 11	4.9 09	5.0 08	5.7 08
58	RA DEC	16 48 -69 00	0.4 51	2.3 47	4.5 46	6.8 49	8.7 55	9.9 62	10.1 69	9.5 75	8.1 78	6.5 76	5.4 70	5.3 62	6.4 55
59	RA DEC	17 10 -15 43	1.8 00	2.6 03	3.4 04	4.4 05	5.2 05	5.8 04	6.0 02	5.9 01	5.5 00	5.0 00	4.5 00	4.5 00	5.0 02
60	RA DEC	17 33 -37 05	11.7 53	12.6 52	13.6 51	14.7 52	15.7 53	16.5 55	16.9 57	16.8 60	16.4 61	15.7 61	15.1 59	15.0 56	15.5 53
61	RA DEC	17 34 12 33	38.9 52	39.5 46	40.3 42	41.2 42	42.0 46	42.6 51	42.8 57	42.7 63	42.3 66	41.8 66	41.3 63	41.1 59	41.4 53
62	RA DEC	17 56 51 29	26.2 23	26.9 13	27.9 08	29.1 07	30.2 12	31.0 21	31.2 31	30.9 40	30.0 46	29.0 47	28.0 43	27.5 36	27.5 25
63	RA DEC	18 23 -34 23	46.0 12	46.7 09	47.6 08	48.7 07	49.7 06	50.6 07	51.1 08	51.2 10	50.9 12	50.3 13	49.7 12	49.4 10	49.7 07
64	RA DEC	18 36 38 46	43.0 45	43.5 36	44.3 30	45.3 28	46.3 32	47.1 40	47.5 50	47.4 59	46.9 65	46.2 67	45.4 65	44.9 59	44.9 51
65	RA DEC	18 54 -26 18	53.2 12	53.8 11	54.5 10	55.5 08	56.5 07	57.4 05	57.9 05	58.1 05	57.9 06	57.4 07	56.8 07	56.5 07	56.6 05
66	RA DEC	19 50 08 51	29.0 15	29.3 10	29.8 07	30.6 06	31.5 09	32.4 15	33.0 21	33.3 27	33.2 31	32.8 33	32.2 33	31.8 30	31.8 26
67	RA DEC	20 25 -56 44	9.5 78	9.8 71	10.5 64	11.8 57	13.3 53	14.8 52	16.0 54	16.6 59	16.6 65	15.9 70	14.9 73	14.0 71	13.7 65
68	RA DEC	20 41 45 15	12.8 46	12.8 37	13.2 29	14.0 24	15.1 25	16.3 31	17.1 39	17.5 50	17.4 59	16.8 66	16.0 68	15.3 66	14.8 60
69	RA DEC	21 40 -77 24	46.0 68	45.2 59	45.9 49	47.9 39	50.8 32	54.3 29	57.3 31	59.4 37	59.9 45	58.8 53	56.3 58	53.5 58	51.4 52
70	RA DEC	21 43 09 50	53.5 59	53.4 55	53.6 52	54.2 51	55.0 54	55.9 59	56.7 65	57.3 72	57.6 77	57.4 80	57.0 81	56.5 79	56.2 76
71	RA DEC	22 07 -46 58	51.1 90	50.9 85	51.1 78	51.7 70	52.7 63	53.9 58	55.1 56	56.0 57	56.4 62	56.3 68	55.6 73	54.9 75	54.4 73
72	RA DEC	22 57 -29 38	19.4 78	19.1 76	19.2 72	19.5 66	20.2 59	21.2 53	22.2 48	23.0 46	23.6 48	23.6 51	23.3 56	22.8 59	22.4 60
73	RA DEC	23 04 15 10	28.2 33	27.9 29	27.9 26	28.2 24	28.8 25	29.7 29	30.6 35	31.4 42	31.9 49	32.0 53	31.7 55	31.3 54	31.0 52

Table 10a(3). Apparent places of stars, 1995 (degrees)

Star No.	Right Ascension (Hr Min) Declination (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
1	RA DEC	00 08 29 03	8.5 60	8.1 56	7.9 51	7.9 47	8.4 45	9.3 46	10.3 51	11.3 58	11.9 66	12.2 72	12.1 77	11.8 78	11.4 77
2	RA DEC	00 08 59 07	55.8 41	54.9 37	54.3 31	54.3 22	55.0 16	56.4 14	58.0 17	59.4 24	60.3 34	60.7 44	60.5 53	59.8 58	58.9 59
3	RA DEC	00 25 -77 16	27.6 73	25.1 68	23.6 60	23.2 49	24.1 38	26.4 28	29.4 24	32.5 24	34.9 30	35.7 39	34.9 48	32.8 54	30.0 55
4	RA DEC	00 26 -42 19	2.4 71	1.9 69	1.5 64	1.5 56	1.9 47	2.7 39	3.8 32	5.0 30	5.8 32	6.1 37	6.0 44	5.6 50	5.0 53
5	RA DEC	00 40 56 30	14.9 56	14.0 53	13.4 47	13.2 39	13.8 33	14.9 30	16.4 32	17.8 38	18.9 47	19.4 56	19.4 65	18.9 71	18.1 73
6	RA DEC	00 43 -18 00	20.9 55	20.5 56	20.3 54	20.2 51	20.5 45	21.2 38	22.2 31	23.1 26	23.8 25	24.2 26	24.2 30	24.0 34	23.6 37
7	RA DEC	00 56 60 41	26.2 43	25.1 41	24.4 35	24.1 27	24.6 20	25.9 17	27.4 18	29.0 23	30.3 31	31.0 41	31.1 51	30.6 57	29.7 60
8	RA DEC	01 25 60 12	31.5 53	30.4 52	29.6 47	29.1 39	29.5 32	30.6 27	32.1 27	33.8 32	35.1 39	36.0 48	36.3 58	36.0 65	35.2 69
9	RA DEC	01 37 -57 15	32.2 60	31.2 59	30.4 55	29.8 46	29.8 36	30.6 25	31.8 17	33.2 14	34.4 15	35.2 22	35.4 31	34.9 39	34.1 44
10	See Table 11c. Apparent places of Polaris, 1995														
11	RA DEC	02 06 23 26	55.0 27	54.6 25	54.1 23	53.8 20	53.9 18	54.5 18	55.4 21	56.4 26	57.3 31	57.9 36	58.3 39	58.3 41	58.1 41
12	RA DEC	02 58 -40 19	5.6 42	5.0 46	4.3 45	3.7 40	3.5 32	3.8 22	4.5 13	5.5 07	6.6 05	7.4 08	7.9 15	7.9 23	7.6 31
13	RA DEC	03 02 04 04	2.7 11	2.3 09	1.9 08	1.5 07	1.4 09	1.7 12	2.4 17	3.3 22	4.2 26	4.9 27	5.4 27	5.6 25	5.5 22
14	RA DEC	03 23 49 50	60.7 46	60.1 48	59.3 46	58.6 42	58.4 36	58.8 31	59.8 29	61.1 30	62.4 33	63.5 38	64.4 45	64.7 51	64.6 56
15	RA DEC	04 35 16 29	40.1 55	39.9 54	39.5 53	38.9 52	38.6 51	38.7 52	39.2 54	40.0 57	40.9 59	41.8 61	42.6 61	43.1 60	43.2 59
16	RA DEC	05 14 -08 12	19.8 35	19.7 39	19.2 41	18.6 41	18.2 39	18.2 35	18.5 29	19.2 24	20.0 20	20.9 19	21.6 22	22.2 27	22.4 33
17	RA DEC	05 16 45 59	22.2 34	22.0 38	21.4 39	20.5 38	20.0 35	20.0 30	20.5 26	21.4 24	22.6 23	23.9 24	25.0 27	25.8 31	26.2 35
18	RA DEC	05 24 06 20	53.9 36	53.8 34	53.4 33	52.8 32	52.4 33	52.3 35	52.7 38	53.3 41	54.2 44	55.0 45	55.9 43	56.5 41	56.8 37
19	RA DEC	05 25 28 36	61.0 08	60.9 09	60.4 09	59.8 09	59.3 07	59.3 06	59.7 05	60.5 05	61.4 05	62.4 06	63.4 07	64.0 08	64.4 09
20	RA DEC	05 35 -01 12	59.6 26	59.6 30	59.2 31	58.6 32	58.2 30	58.1 27	58.4 23	59.0 18	59.8 15	60.6 15	61.5 17	62.1 21	62.4 26
21	RA DEC	05 40 -01 56	32.4 51	32.4 55	32.0 57	31.4 57	30.9 56	30.8 53	31.1 48	31.7 44	32.5 41	33.4 40	34.2 42	34.8 46	35.1 51
22	RA DEC	05 54 07 24	56.2 15	56.2 12	55.8 11	55.2 11	54.8 12	54.7 13	55.0 16	55.5 19	56.3 21	57.2 21	58.1 20	58.7 17	59.1 14
23	RA DEC	06 23 -52 41	53.1 44	52.8 54	52.1 60	50.9 62	49.9 59	49.3 52	49.2 43	49.7 33	50.7 26	51.8 24	53.1 28	54.0 36	54.3 47
24	RA DEC	06 37 16 24	27.7 04	27.8 03	27.5 03	26.9 03	26.4 04	26.2 04	26.4 05	26.9 06	27.6 06	28.5 06	29.4 04	30.2 02	30.8 00
25	RA DEC	06 44 -16 42	57.8 42	57.8 49	57.5 53	56.9 54	56.3 53	56.0 49	56.1 43	56.5 37	57.2 32	58.0 31	58.9 34	59.7 41	60.2 48

Table 10a(3). Apparent places of stars, 1995 (degrees) - continued

Star No.	Right Ascension (Hr Min) Declination (° ')	ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
		Seconds (time of RA or arc of declination)												
26	RA 06 58 DEC -28 57	28.0 63	28.0 72	27.6 77	27.0 79	26.3 78	26.0 73	25.9 66	26.3 58	26.9 52	27.8 50	28.8 53	29.6 60	30.1 69
27	RA 07 08 DEC -26 23	13.5 15	13.6 23	13.2 28	12.6 31	12.0 30	11.6 25	11.6 19	11.9 11	12.5 05	13.3 03	14.3 06	15.1 13	15.7 22
28	RA 07 34 DEC 31 53	19.3 46	19.6 48	19.4 50	18.8 52	18.2 53	17.8 52	17.9 50	18.2 47	18.9 45	19.8 42	20.9 39	21.9 38	22.7 38
29	RA 07 39 DEC 05 13	4.5 66	4.8 63	4.6 61	4.1 61	3.6 61	3.3 63	3.3 65	3.6 67	4.1 69	4.9 68	5.8 65	6.7 61	7.3 56
30	RA 07 45 DEC 28 01	2.9 66	3.3 67	3.1 68	2.5 70	2.0 71	1.6 70	1.6 69	1.9 68	2.5 65	3.4 63	4.4 60	5.4 57	6.2 56
31	RA 08 09 DEC -47 19	25.3 22	25.6 33	25.3 42	24.5 47	23.6 48	22.9 45	22.5 38	22.5 29	23.1 21	23.9 16	25.1 17	26.2 23	27.1 33
32	RA 08 22 DEC -59 29	27.9 38	28.2 50	27.8 59	26.7 66	25.5 68	24.4 65	23.8 59	23.6 49	24.1 40	25.2 34	26.7 34	28.1 39	29.1 50
33	RA 09 07 DEC -43 24	51.1 45	51.6 56	51.6 65	51.0 72	50.3 74	49.7 73	49.2 68	49.1 60	49.3 52	50.0 47	51.0 46	52.2 50	53.2 59
34	RA 09 13 DEC -69 41	13.0 45	13.7 56	13.4 67	12.2 76	10.5 80	8.7 80	7.4 75	6.7 67	6.9 57	8.1 50	10.0 47	12.1 50	13.8 59
35	RA 09 27 DEC -08 38	22.3 20	22.9 27	23.0 31	22.7 34	22.3 34	21.9 32	21.6 29	21.6 26	21.8 22	22.4 21	23.2 23	24.1 28	25.0 35
36	RA 10 08 DEC 11 59	7.9 18	8.6 14	8.9 13	8.7 14	8.3 16	7.9 17	7.7 19	7.6 20	7.7 19	8.1 16	8.9 12	9.8 07	10.7 01
37	RA 11 01 DEC 56 23	33.7 70	35.0 72	35.6 78	35.5 85	34.9 92	34.0 95	33.3 94	32.7 89	32.6 82	32.9 72	33.9 63	35.2 56	36.7 52
38	RA 11 03 DEC 61 45	26.5 77	28.0 79	28.7 85	28.6 94	27.8 100	26.8 103	25.8 102	25.1 97	24.9 88	25.3 79	26.3 69	27.8 62	29.6 59
39	RA 11 48 DEC 14 35	49.2 48	50.1 44	50.7 43	50.8 44	50.7 47	50.3 50	50.0 52	49.7 53	49.5 52	49.6 48	50.1 43	50.9 37	51.9 30
40	RA 11 53 DEC 53 42	34.7 59	36.0 59	36.8 63	37.0 71	36.6 78	35.9 83	35.2 84	34.5 81	34.1 74	34.2 65	34.8 55	35.9 46	37.3 41
41	RA 12 15 DEC -17 30	33.9 51	34.9 58	35.5 63	35.7 68	35.7 70	35.5 71	35.1 69	34.8 66	34.5 63	34.5 60	35.0 60	35.7 63	36.7 68
42	RA 12 26 DEC -63 04	20.9 03	22.7 10	23.7 19	24.2 30	24.0 39	23.3 45	22.4 47	21.3 44	20.4 38	20.3 30	20.9 22	22.3 19	24.2 21
43	RA 12 30 DEC -57 04	54.8 54	56.3 61	57.2 70	57.6 80	57.6 88	57.1 94	56.3 96	55.4 93	54.8 87	54.6 79	55.2 72	56.4 70	58.0 72
44	RA 12 47 DEC -59 39	27.1 27	28.7 34	29.8 42	30.4 52	30.4 61	29.9 68	29.1 70	28.1 68	27.3 62	27.1 54	27.6 47	28.8 43	30.5 45
45	RA 12 53 DEC 55 58	48.3 52	49.9 50	50.9 53	51.4 61	51.2 69	50.7 76	49.9 79	49.0 77	48.3 72	48.0 63	48.3 52	49.2 42	50.5 35
46	RA 13 23 DEC 54 56	42.9 46	44.4 42	45.5 45	46.1 52	46.1 60	45.7 68	44.9 72	44.1 72	43.3 67	42.8 59	42.9 48	43.7 38	44.9 30
47	RA 13 24 DEC -11 08	56.3 06	57.3 13	58.0 17	58.5 20	58.7 21	58.6 21	58.4 20	58.0 18	57.6 15	57.4 14	57.6 15	58.2 17	59.2 23
48	RA 13 47 DEC 49 19	20.1 60	21.4 56	22.4 57	23.1 63	23.2 72	22.9 79	22.4 84	21.6 85	20.8 82	20.4 74	20.4 64	21.0 54	22.0 45
49	RA 14 03 DEC -60 20	28.8 41	30.6 44	32.0 51	33.0 59	33.5 68	33.4 75	32.9 80	31.9 80	30.9 77	30.3 70	30.3 63	31.2 57	32.8 56
50	RA 14 06 DEC -36 20	23.7 34	24.9 39	25.9 45	26.5 51	26.9 56	26.9 60	26.7 62	26.2 61	25.6 58	25.3 54	25.4 49	25.9 48	27.0 49

Table 10a(3). Apparent places of stars, 1995 (degrees) - continued

Star No.	Right Ascen- sion (Hr Min) Declina- tion (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
51	RA DEC	14 15 19 12	25.9 22	26.9 16	27.7 14	28.3 16	28.6 20	28.6 25	28.3 29	27.9 31	27.4 31	27.1 28	27.1 22	27.5 14	28.3 06
52	RA DEC	14 39 -60 48	15.8 38	17.6 40	19.0 45	20.2 53	20.8 61	20.9 68	20.4 73	19.4 75	18.3 72	17.5 66	17.4 59	18.1 53	19.5 50
53	RA DEC	14 50 -16 01	36.2 11	37.2 16	38.1 20	38.8 23	39.2 25	39.4 25	39.3 24	38.9 23	38.4 21	38.1 20	38.0 19	38.4 20	39.2 24
54	RA DEC	14 50 74 10	38.9 18	41.4 12	43.7 13	45.7 20	46.4 29	45.8 39	44.2 45	42.0 47	39.6 45	37.7 38	36.6 27	36.9 16	38.5 06
55	RA DEC	15 34 26 43	27.9 48	28.9 41	29.8 38	30.6 40	31.1 45	31.3 53	31.2 59	30.8 63	30.2 64	29.7 61	29.4 55	29.6 47	30.2 39
56	RA DEC	16 00 -22 36	2.0 20	3.0 23	3.9 26	4.8 28	5.4 30	5.9 31	5.9 31	5.7 31	5.2 30	4.7 28	4.4 27	4.6 26	5.2 28
57	RA DEC	16 29 -26 25	5.7 08	6.6 10	7.6 12	8.5 14	9.3 15	9.8 17	9.9 18	9.7 18	9.2 17	8.7 16	8.3 14	8.4 13	9.0 13
58	RA DEC	16 48 -69 00	6.4 55	8.4 50	10.5 50	12.8 53	14.6 58	15.8 65	16.1 73	15.4 79	14.0 82	12.5 80	11.3 74	11.2 66	12.2 59
59	RA DEC	17 10 -15 43	5.0 02	5.8 04	6.6 06	7.5 07	8.3 06	8.9 05	9.2 04	9.1 03	8.6 02	8.1 02	7.7 02	7.7 02	8.1 04
60	RA DEC	17 33 -37 05	15.5 53	16.4 51	17.4 51	18.5 52	19.4 53	20.2 55	20.6 57	20.6 60	20.1 61	19.4 61	18.9 59	18.7 56	19.2 53
61	RA DEC	17 34 12 33	41.4 53	42.1 46	42.9 42	43.8 42	44.5 46	45.1 51	45.4 57	45.3 62	44.8 65	44.3 66	43.8 63	43.6 58	43.9 52
62	RA DEC	17 56 51 29	27.5 25	28.2 15	29.2 10	30.4 09	31.5 14	32.2 23	32.5 33	32.1 42	31.3 48	30.3 49	29.3 45	28.7 37	28.8 27
63	RA DEC	18 23 -34 23	49.7 07	50.4 05	51.2 04	52.3 03	53.3 02	54.2 03	54.8 04	54.8 06	54.5 08	53.9 09	53.3 08	53.0 06	53.2 04
64	RA DEC	18 36 38 46	44.9 51	45.4 41	46.2 35	47.2 34	48.2 38	49.0 46	49.4 55	49.3 64	48.8 70	48.1 73	47.3 70	46.8 64	46.8 55
65	RA DEC	18 54 -26 17	56.6 65	57.2 64	57.9 63	58.9 62	59.8 60	60.7 59	61.3 58	61.5 59	61.3 60	60.7 61	60.2 61	59.8 61	60.0 60
66	RA DEC	19 50 08 51	31.8 26	32.1 21	32.6 18	33.3 17	34.2 20	35.1 26	35.7 32	36.0 38	35.8 42	35.4 44	34.9 43	34.5 41	34.4 36
67	RA DEC	20 25 -56 44	13.7 65	14.0 58	14.8 51	16.0 45	17.4 41	19.0 40	20.2 42	20.8 47	20.8 53	20.1 58	19.1 60	18.2 59	17.8 53
68	RA DEC	20 41 45 15	14.8 60	14.8 51	15.2 43	16.0 38	17.1 38	18.2 44	19.1 53	19.5 63	19.3 73	18.8 79	18.0 82	17.2 79	16.7 73
69	RA DEC	21 40 -77 24	51.4 52	50.7 42	51.3 33	53.3 23	56.2 16	59.6 13	62.7 15	64.8 21	65.3 29	64.2 37	61.7 42	59.0 42	56.8 37
70	RA DEC	21 43 09 51	56.2 16	56.2 12	56.4 09	56.9 08	57.7 10	58.6 15	59.5 22	60.0 28	60.2 33	60.1 36	59.7 37	59.2 35	58.9 32
71	RA DEC	22 07 -46 58	54.4 73	54.2 67	54.4 61	55.0 53	56.0 46	57.2 41	58.4 39	59.4 40	59.7 45	59.6 51	59.0 56	58.2 58	57.7 56
72	RA DEC	22 57 -29 38	22.4 60	22.1 58	22.1 54	22.5 48	23.1 41	24.1 35	25.1 30	26.0 28	26.5 30	26.5 33	26.2 38	25.7 41	25.3 42
73	RA DEC	23 04 15 10	31.0 52	30.7 48	30.7 45	31.0 42	31.6 43	32.5 47	33.4 54	34.2 60	34.6 67	34.7 71	34.5 73	34.1 72	33.7 70

Table 10a(4). Apparent places of stars, 1996 (degrees)

Star No.	Right Ascen- sion (Hr Min) Declina- tion (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
1	RA DEC	00 08 29 04	11.4 17	11.0 14	10.7 09	10.8 04	11.3 02	12.1 04	13.2 09	14.1 16	14.7 23	15.0 30	14.9 34	14.6 36	14.2 35
2	RA DEC	00 08 59 07	58.9 59	58.0 55	57.4 48	57.4 40	58.1 33	59.5 32	61.0 35	62.4 42	63.3 51	63.7 61	63.5 70	62.8 76	61.8 77
3	RA DEC	00 25 -77 16	30.0 55	27.5 50	26.0 42	25.6 30	26.6 19	28.9 10	31.9 06	35.1 06	37.4 12	38.3 21	37.4 30	35.4 36	32.6 37
4	RA DEC	00 26 -42 19	5.0 53	4.4 52	4.1 47	4.0 39	4.5 30	5.3 21	6.4 15	7.6 13	8.4 15	8.7 20	8.6 27	8.2 33	7.6 36
5	RA DEC	00 40 56 30	18.1 73	17.2 71	16.6 64	16.4 56	17.0 50	18.2 47	19.6 49	21.0 56	22.0 65	22.5 74	22.5 83	22.1 89	21.2 91
6	RA DEC	00 43 -18 00	23.6 37	23.2 38	22.9 37	22.9 33	23.2 27	23.9 20	24.8 14	25.8 09	26.5 07	26.8 09	26.9 13	26.6 17	26.2 20
7	RA DEC	00 56 60 41	29.7 60	28.6 58	27.8 52	27.5 44	28.0 37	29.3 33	30.9 35	32.5 40	33.7 49	34.3 58	34.4 68	33.9 75	33.0 77
8	RA DEC	01 25 60 12	35.2 69	34.2 68	33.3 63	32.9 55	33.2 48	34.3 43	35.9 44	37.5 48	38.8 56	39.6 65	39.9 74	39.6 81	38.8 85
9	RA DEC	01 37 -57 14	34.1 104	33.0 104	32.2 99	31.7 90	31.7 80	32.5 69	33.7 61	35.1 58	36.4 60	37.1 66	37.3 75	36.8 83	36.0 88
10	See Table 11d. Apparent places of Polaris, 1996														
11	RA DEC	02 06 23 26	58.1 41	57.7 39	57.2 37	56.9 34	57.0 32	57.6 33	58.5 36	59.5 41	60.4 46	61.0 50	61.3 54	61.4 56	61.1 56
12	RA DEC	02 58 -40 18	7.6 91	7.0 94	6.3 93	5.7 88	5.5 80	5.8 70	6.5 61	7.5 55	8.6 53	9.4 56	9.9 63	9.9 71	9.6 79
13	RA DEC	03 02 04 04	5.5 22	5.1 20	4.7 19	4.3 19	4.2 20	4.6 24	5.3 29	6.2 34	7.0 38	7.7 39	8.2 39	8.4 37	8.3 34
14	RA DEC	03 24 49 50	4.6 56	4.0 58	3.2 56	2.5 52	2.3 46	2.7 42	3.7 39	5.0 40	6.3 44	7.4 49	8.2 55	8.6 61	8.5 66
15	RA DEC	04 35 16 29	43.2 59	43.0 59	42.5 58	42.0 57	41.7 57	41.8 57	42.3 59	43.1 62	44.0 64	44.9 66	45.6 66	46.1 66	46.3 65
16	RA DEC	05 14 -08 12	22.4 33	22.3 37	21.8 39	21.2 39	20.8 37	20.8 32	21.1 27	21.8 21	22.6 17	23.4 17	24.2 20	24.8 24	25.0 30
17	RA DEC	05 16 45 59	26.2 35	26.0 39	25.4 41	24.5 40	24.0 36	24.0 32	24.5 28	25.5 26	26.6 25	27.8 27	29.0 29	29.8 33	30.1 38
18	RA DEC	05 24 06 20	56.8 37	56.7 35	56.2 34	55.7 34	55.3 34	55.2 36	55.6 39	56.3 43	57.1 46	57.9 46	58.7 45	59.3 42	59.6 39
19	RA DEC	05 26 28 36	4.4 09	4.3 10	3.8 10	3.2 10	2.7 08	2.7 07	3.1 06	3.9 06	4.8 07	5.8 08	6.7 08	7.4 09	7.8 11
20	RA DEC	05 36 -01 12	2.4 26	2.3 29	1.9 31	1.3 31	0.9 30	0.8 27	1.1 22	1.7 18	2.5 14	3.4 14	4.2 16	4.8 20	5.1 25
21	RA DEC	05 40 -01 56	35.1 51	35.1 55	34.7 57	34.1 57	33.6 55	33.5 52	33.8 48	34.5 43	35.2 40	36.1 39	36.9 42	37.5 46	37.8 50
22	RA DEC	05 54 07 24	59.1 14	59.1 11	58.7 10	58.2 10	57.7 11	57.6 12	57.9 15	58.5 18	59.3 20	60.1 21	61.0 19	61.6 16	62.0 13
23	RA DEC	06 23 -52 41	54.3 47	54.0 57	53.2 63	52.1 65	51.1 62	50.5 55	50.4 46	50.9 36	51.9 29	53.1 27	54.3 31	55.2 39	55.5 50
24	RA DEC	06 37 16 23	30.8 60	30.9 59	30.6 59	30.0 59	29.5 59	29.3 60	29.5 60	30.0 62	30.7 62	31.6 62	32.5 60	33.3 58	33.8 56
25	RA DEC	06 44 -16 42	60.2 48	60.2 55	59.8 59	59.2 60	58.7 59	58.4 54	58.5 49	58.9 42	59.6 38	60.4 37	61.3 40	62.0 46	62.5 54

Table 10a(4). Apparent places of stars, 1996 (degrees) - continued

Star No.	Right Ascension (Hr Min) Declination (° ')	ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
		Seconds (time of RA or arc of declination)												
26	RA 06 58 DEC -28 57	30.1 69	30.2 78	29.8 83	29.1 85	28.4 83	28.1 79	28.1 71	28.4 64	29.1 57	29.9 56	30.9 58	31.7 65	32.2 74
27	RA 07 08 DEC -26 23	15.7 22	15.8 30	15.4 35	14.8 37	14.2 36	13.8 32	13.8 25	14.1 17	14.7 11	15.5 09	16.5 12	17.3 19	17.9 28
28	RA 07 34 DEC 31 53	22.7 38	23.0 39	22.8 42	22.2 44	21.6 44	21.2 43	21.3 41	21.7 39	22.3 37	23.2 34	24.3 31	25.3 30	26.1 30
29	RA 07 39 DEC 05 13	7.3 56	7.6 53	7.4 51	6.9 51	6.4 52	6.1 53	6.1 55	6.4 58	7.0 59	7.7 59	8.6 56	9.5 52	10.1 47
30	RA 07 45 DEC 28 01	6.2 56	6.5 57	6.3 59	5.8 61	5.2 62	4.8 61	4.8 60	5.2 58	5.8 56	6.6 54	7.7 51	8.6 49	9.4 48
31	RA 08 09 DEC -47 19	27.1 33	27.3 44	27.0 53	26.2 58	25.3 59	24.6 55	24.2 49	24.3 39	24.8 31	25.6 27	26.8 27	27.9 33	28.7 43
32	RA 08 22 DEC -59 29	29.1 50	29.4 61	29.0 71	27.9 78	26.7 79	25.6 77	24.9 70	24.8 60	25.3 51	26.4 45	27.9 45	29.3 51	30.3 61
33	RA 09 07 DEC -43 24	53.2 59	53.7 70	53.6 79	53.1 86	52.4 88	51.7 87	51.2 82	51.1 74	51.4 65	52.0 60	53.1 59	54.2 64	55.2 73
34	RA 09 13 DEC -69 41	13.8 59	14.5 71	14.2 81	12.9 90	11.2 95	9.4 94	8.1 89	7.4 80	7.6 71	8.8 63	10.8 61	12.8 64	14.5 73
35	RA 09 27 DEC -08 38	25.0 35	25.5 42	25.6 47	25.4 49	24.9 49	24.5 47	24.3 44	24.3 40	24.5 37	25.0 36	25.8 38	26.7 43	27.6 50
36	RA 10 08 DEC 11 58	10.7 61	11.5 57	11.7 56	11.6 57	11.2 59	10.7 61	10.5 62	10.4 63	10.5 63	10.9 60	11.7 56	12.6 50	13.6 45
37	RA 11 01 DEC 56 23	36.7 52	38.0 54	38.7 60	38.6 68	38.0 74	37.1 78	36.3 76	35.8 72	35.7 64	36.0 55	37.0 45	38.3 38	39.9 35
38	RA 11 03 DEC 61 45	29.6 59	31.1 61	31.8 67	31.7 76	30.9 83	29.8 86	28.9 84	28.2 79	28.0 71	28.4 61	29.5 51	31.0 44	32.8 41
39	RA 11 48 DEC 14 35	51.9 30	52.8 26	53.4 24	53.5 26	53.4 29	53.0 32	52.7 34	52.4 35	52.2 33	52.3 30	52.8 25	53.6 18	54.6 12
40	RA 11 53 DEC 53 42	37.3 41	38.7 41	39.5 45	39.7 53	39.3 60	38.6 65	37.8 66	37.2 63	36.8 56	36.9 47	37.5 37	38.6 28	40.1 23
41	RA 12 15 DEC -17 31	36.7 08	37.7 15	38.3 21	38.6 26	38.5 28	38.2 28	37.9 27	37.5 24	37.3 21	37.3 18	37.7 18	38.5 20	39.5 26
42	RA 12 26 DEC -63 04	24.2 21	25.9 28	27.0 37	27.4 48	27.2 57	26.5 63	25.5 65	24.4 62	23.6 55	23.4 47	24.1 40	25.5 36	27.3 38
43	RA 12 30 DEC -57 05	58.0 12	59.5 19	60.4 28	60.8 38	60.7 46	60.2 52	59.4 54	58.5 51	57.9 44	57.7 37	58.3 30	59.5 27	61.0 30
44	RA 12 47 DEC -59 39	30.5 45	32.1 51	33.2 60	33.7 70	33.7 79	33.2 85	32.4 87	31.4 85	30.6 79	30.3 71	30.9 64	32.1 60	33.7 62
45	RA 12 53 DEC 55 58	50.5 35	52.0 33	53.1 36	53.6 44	53.5 52	52.8 59	52.0 62	51.2 60	50.5 54	50.2 46	50.5 35	51.4 25	52.8 18
46	RA 13 23 DEC 54 56	44.9 30	46.4 26	47.5 29	48.2 36	48.2 44	47.7 52	46.9 56	46.1 55	45.3 50	44.9 42	45.0 32	45.8 21	47.1 13
47	RA 13 24 DEC -11 08	59.2 23	60.2 29	60.9 34	61.4 37	61.5 38	61.4 37	61.2 36	60.8 34	60.4 32	60.3 30	60.5 31	61.1 34	62.0 39
48	RA 13 47 DEC 49 19	22.0 45	23.4 41	24.4 42	25.1 48	25.2 56	24.9 64	24.3 69	23.6 69	22.9 66	22.4 59	22.4 49	23.0 38	24.1 29
49	RA 14 03 DEC -60 20	32.8 56	34.6 59	36.0 65	37.0 74	37.4 83	37.4 90	36.8 95	35.8 95	34.8 91	34.2 85	34.2 77	35.1 72	36.7 71
50	RA 14 06 DEC -36 20	27.0 49	28.2 54	29.1 60	29.8 66	30.1 71	30.1 75	29.9 77	29.4 76	28.8 73	28.5 69	28.5 65	29.1 63	30.2 64

Table 10a(4). Apparent places of stars, 1996 (degrees) - continued

Star No.	Right Ascen- sion (Hr Min) Decli- nation (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
51	RA DEC	14 15 19 11	28.3 66	29.3 60	30.2 58	30.8 60	31.0 64	31.0 69	30.7 73	30.3 75	29.8 75	29.5 72	29.5 66	29.9 58	30.8 50
52	RA DEC	14 39 -60 48	19.5 50	21.3 52	22.8 57	24.0 65	24.6 73	24.6 81	24.1 86	23.1 87	22.0 84	21.2 78	21.1 71	21.8 65	23.2 62
53	RA DEC	14 50 -16 01	39.2 24	40.2 28	41.1 33	41.8 36	42.2 37	42.4 37	42.3 37	41.9 35	41.4 34	41.0 32	41.0 32	41.4 33	42.2 36
54	RA DEC	14 50 74 09	38.5 66	40.9 60	43.4 61	45.3 68	46.0 77	45.4 87	43.8 93	41.6 95	39.3 92	37.4 85	36.4 74	36.6 63	38.3 53
55	RA DEC	15 34 26 43	30.2 39	31.1 32	32.1 29	32.9 30	33.4 36	33.6 43	33.5 49	33.1 53	32.5 54	31.9 51	31.6 45	31.8 37	32.5 28
56	RA DEC	16 00 -22 36	5.2 28	6.2 30	7.2 34	8.0 36	8.7 38	9.0 39	9.1 39	8.9 39	8.3 38	7.8 36	7.6 35	7.8 35	8.4 36
57	RA DEC	16 29 -26 25	9.0 13	10.0 15	10.9 17	11.9 19	12.6 21	13.1 22	13.2 23	13.0 24	12.5 23	11.9 22	11.6 20	11.7 19	12.3 20
58	RA DEC	16 48 -69 00	12.2 59	14.2 54	16.4 54	18.7 57	20.5 63	21.6 70	21.9 77	21.2 84	19.7 86	18.1 84	17.0 78	16.9 71	18.0 64
59	RA DEC	17 10 -15 43	8.1 04	8.9 06	9.8 08	10.7 09	11.4 09	12.0 08	12.2 07	12.1 06	11.7 05	11.1 05	10.7 04	10.7 05	11.2 07
60	RA DEC	17 33 -37 05	19.2 53	20.1 52	21.1 52	22.2 53	23.1 54	23.9 56	24.3 58	24.2 61	23.7 62	23.0 62	22.5 60	22.4 57	22.8 55
61	RA DEC	17 34 12 33	43.9 52	44.6 46	45.4 42	46.3 41	47.0 45	47.6 51	47.9 56	47.8 61	47.3 64	46.7 64	46.3 62	46.1 57	46.4 50
62	RA DEC	17 56 51 29	28.8 27	29.4 17	30.5 11	31.7 10	32.8 15	33.5 24	33.7 34	33.4 43	32.5 48	31.5 49	30.5 46	30.0 38	30.0 27
63	RA DEC	18 23 -34 22	53.2 64	53.9 62	54.8 60	55.9 60	56.9 59	57.8 60	58.3 61	58.4 64	58.0 66	57.4 66	56.8 66	56.5 64	56.8 61
64	RA DEC	18 36 38 46	46.8 55	47.3 46	48.0 40	49.1 38	50.0 42	50.8 50	51.2 60	51.1 68	50.6 74	49.8 77	49.1 74	48.6 68	48.6 59
65	RA DEC	18 55 -26 17	0.0 60	0.5 59	1.3 58	2.2 56	3.2 55	4.0 53	4.6 53	4.8 54	4.6 55	4.0 56	3.4 56	3.1 56	3.3 55
66	RA DEC	19 50 08 51	34.4 36	34.7 31	35.2 28	36.0 27	36.9 30	37.7 36	38.3 42	38.6 48	38.5 51	38.0 53	37.5 53	37.1 50	37.0 45
67	RA DEC	20 25 -56 44	17.8 53	18.1 46	18.9 39	20.2 33	21.6 29	23.1 28	24.3 30	25.0 36	24.9 42	24.2 47	23.2 49	22.4 47	22.0 42
68	RA DEC	20 41 45 15	16.7 73	16.7 64	17.1 56	17.9 51	19.0 51	20.1 57	21.0 66	21.4 76	21.2 85	20.6 91	19.8 94	19.1 91	18.6 85
69	RA DEC	21 40 -77 23	56.8 97	56.1 87	56.8 77	58.8 67	61.7 61	65.1 58	68.2 60	70.4 66	70.9 75	69.6 83	67.2 88	64.5 87	62.4 82
70	RA DEC	21 43 09 51	58.9 32	58.9 28	59.1 25	59.6 24	60.3 26	61.3 31	62.1 37	62.7 44	62.9 49	62.7 51	62.3 52	61.8 51	61.5 47
71	RA DEC	22 07 -46 58	57.7 56	57.5 51	57.7 44	58.3 36	59.3 30	60.5 24	61.7 22	62.7 24	63.0 29	62.8 35	62.2 40	61.5 42	61.0 40
72	RA DEC	22 57 -29 38	25.3 42	25.0 40	25.1 36	25.4 30	26.1 24	27.0 17	28.1 13	28.9 11	29.4 13	29.4 16	29.1 21	28.6 24	28.2 25
73	RA DEC	23 04 15 11	33.7 10	33.5 06	33.4 02	33.7 00	34.3 01	35.2 05	36.1 11	36.9 18	37.3 24	37.4 28	37.1 30	36.8 30	36.4 27

Table 10a(5). Apparent places of stars, 1997 (degrees)

Star No.	Right Ascension (Hr Min) Declination (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
1	RA DEC	00 08 29 04	14.2 35	13.7 31	13.5 26	13.6 22	14.0 20	14.9 21	15.9 26	16.9 33	17.5 41	17.7 47	17.7 52	17.3 53	16.9 52
2	RA DEC	00 09 59 07	1.8 77	0.8 72	0.3 66	0.3 57	1.0 51	2.3 49	3.9 52	5.3 59	6.2 69	6.5 79	6.3 88	5.6 93	4.7 94
3	RA DEC	00 25 -77 15	32.6 97	30.1 92	28.6 84	28.3 73	29.3 61	31.6 53	34.6 48	37.8 48	40.2 54	41.1 63	40.3 72	38.2 78	35.5 79
4	RA DEC	00 26 -42 18	7.6 96	7.0 95	6.6 90	6.6 82	7.1 73	7.9 64	9.0 58	10.1 55	11.0 57	11.3 63	11.2 70	10.8 76	10.2 79
5	RA DEC	00 40 56 31	21.2 31	20.3 28	19.7 22	19.5 14	20.1 07	21.2 05	22.6 07	24.1 13	25.1 22	25.6 31	25.5 40	25.1 46	24.2 48
6	RA DEC	00 43 -17 59	26.2 80	25.8 81	25.6 80	25.5 76	25.9 70	26.6 63	27.5 56	28.4 51	29.1 50	29.5 52	29.5 56	29.3 60	28.9 63
7	RA DEC	00 56 60 41	33.0 77	31.9 75	31.1 69	30.8 61	31.3 54	32.5 51	34.1 52	35.7 57	36.9 66	37.5 75	37.6 85	37.1 92	36.2 95
8	RA DEC	01 25 60 13	38.8 25	37.7 24	36.8 19	36.4 11	36.8 04	37.8 00	39.3 00	41.0 04	42.3 12	43.1 21	43.4 30	43.1 38	42.3 42
9	RA DEC	01 37 -57 14	36.0 88	34.9 88	34.1 83	33.6 74	33.7 64	34.4 53	35.6 46	37.0 42	38.3 43	39.1 50	39.2 59	38.8 67	38.0 72

10 See Table 11e. Apparent places of Polaris, 1997

11	RA 02 06 DEC 23 26	61.1 56	60.7 54	60.2 51	59.9 49	60.0 47	60.6 48	61.5 50	62.5 55	63.4 61	64.0 65	64.3 69	64.3 70	64.1 71
12	RA 02 58 DEC -40 18	9.6 79	8.9 82	8.2 81	7.7 76	7.5 67	7.8 58	8.5 49	9.5 42	10.6 40	11.4 43	11.9 50	11.9 59	11.6 66
13	RA 03 02 DEC 04 04	8.3 34	7.9 32	7.4 31	7.1 31	7.0 32	7.3 36	8.0 41	8.9 46	9.8 50	10.5 52	11.0 51	11.1 49	11.1 47
14	RA 03 24 DEC 49 50	8.5 66	7.8 68	7.1 67	6.4 63	6.2 57	6.6 53	7.5 50	8.8 51	10.1 55	11.2 60	12.0 66	12.4 73	12.3 78
15	RA 04 35 DEC 16 30	46.3 05	46.0 04	45.6 03	45.0 03	44.7 02	44.8 03	45.3 05	46.2 08	47.1 11	47.9 12	48.7 13	49.2 12	49.4 11
16	RA 05 14 DEC -08 12	25.0 30	24.8 34	24.3 36	23.8 36	23.4 33	23.3 29	23.6 23	24.3 18	25.2 14	26.0 13	26.7 16	27.3 21	27.5 26
17	RA 05 16 DEC 45 59	30.1 38	29.9 41	29.3 43	28.5 42	27.9 39	27.9 35	28.4 31	29.4 29	30.6 28	31.7 30	32.9 32	33.7 36	34.1 41
18	RA 05 24 DEC 06 20	59.6 39	59.5 37	59.1 36	58.5 36	58.1 37	58.1 39	58.4 42	59.1 46	59.9 48	60.8 49	61.5 48	62.2 45	62.5 42
19	RA 05 26 DEC 28 36	7.8 11	7.6 12	7.2 12	6.6 12	6.1 11	6.1 09	6.5 08	7.2 08	8.2 09	9.1 10	10.1 11	10.8 12	11.1 13
20	RA 05 36 DEC -01 12	5.1 25	5.0 28	4.6 30	4.0 30	3.6 28	3.5 25	3.8 21	4.4 16	5.2 13	6.0 12	6.8 14	7.5 18	7.8 22
21	RA 05 40 DEC -01 56	37.8 50	37.7 54	37.3 56	36.8 56	36.3 54	36.2 51	36.5 47	37.1 42	37.9 39	38.7 38	39.5 40	40.2 44	40.5 49
22	RA 05 55 DEC 07 24	2.0 13	2.0 11	1.6 10	1.0 10	0.6 11	0.5 13	0.7 15	1.3 18	2.1 21	3.0 21	3.8 20	4.5 17	4.9 14
23	RA 06 23 DEC -52 41	55.5 50	55.2 60	54.4 66	53.3 67	52.3 64	51.7 57	51.6 48	52.1 38	53.1 30	54.2 28	55.4 32	56.3 41	56.7 52
24	RA 06 37 DEC 16 23	33.8 56	33.9 55	33.6 55	33.1 56	32.6 56	32.3 57	32.5 57	33.0 59	33.8 59	34.6 59	35.5 58	36.3 55	36.9 54
25	RA 06 45 DEC -16 42	2.5 54	2.5 61	2.2 64	1.6 66	1.0 64	0.7 59	0.8 53	1.2 47	1.9 43	2.7 41	3.6 44	4.4 51	4.8 58

Table 10a(5). Apparent places of stars, 1997 (degrees) - continued

Star No.	Right Ascen- sion (Hr Min) Decl- ination (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
26	RA DEC	06 58 -28 58	32.2 14	32.2 23	31.8 28	31.2 30	30.6 28	30.1 23	30.1 16	30.5 08	31.2 02	32.0 00	32.9 03	33.8 09	34.3 19
27	RA DEC	07 08 -26 23	17.9 28	17.9 36	17.6 41	16.9 43	16.3 42	15.9 37	15.9 30	16.2 23	16.9 17	17.7 14	18.6 17	19.5 24	20.0 32
28	RA DEC	07 34 31 53	26.1 30	26.3 32	26.1 34	25.6 36	25.0 37	24.6 36	24.6 34	25.0 32	25.7 29	26.6 27	27.6 24	28.6 23	29.5 23
29	RA DEC	07 39 05 13	10.1 47	10.3 44	10.2 42	9.7 42	9.2 43	8.8 45	8.8 47	9.1 49	9.7 51	10.5 51	11.3 48	12.2 44	12.9 39
30	RA DEC	07 45 28 01	9.4 48	9.7 49	9.5 51	9.0 53	8.5 54	8.1 53	8.0 52	8.4 50	9.0 48	9.9 46	10.9 43	11.8 41	12.7 40
31	RA DEC	08 09 -47 19	28.7 43	29.0 54	28.6 63	27.9 68	27.0 69	26.2 65	25.8 58	25.9 49	26.4 41	27.3 36	28.4 36	29.5 43	30.4 53
32	RA DEC	08 22 -59 29	30.3 61	30.5 72	30.1 82	29.0 88	27.8 90	26.7 87	26.0 80	25.9 71	26.4 61	27.4 56	28.9 55	30.3 61	31.4 71
33	RA DEC	09 07 -43 25	55.2 13	55.7 24	55.6 32	55.1 39	54.4 42	53.6 40	53.2 35	53.0 27	53.3 18	54.0 13	55.0 12	56.1 17	57.1 26
34	RA DEC	09 13 -69 42	14.5 13	15.2 24	14.8 35	13.6 44	11.8 48	10.0 47	8.7 42	8.0 34	8.2 24	9.3 16	11.3 13	13.4 17	15.0 26
35	RA DEC	09 27 -08 38	27.6 50	28.1 56	28.2 61	28.0 63	27.5 63	27.1 61	26.9 58	26.8 54	27.1 51	27.6 50	28.4 52	29.3 57	30.2 64
36	RA DEC	10 08 11 58	13.6 45	14.3 42	14.5 41	14.4 41	14.0 43	13.6 45	13.3 47	13.2 47	13.3 47	13.8 45	14.5 40	15.4 35	16.4 29
37	RA DEC	11 01 56 23	39.9 35	41.2 37	41.8 43	41.7 50	41.1 57	40.3 60	39.5 59	39.0 55	38.9 47	39.2 38	40.1 28	41.5 21	43.1 18
38	RA DEC	11 03 61 45	32.8 41	34.3 44	34.9 50	34.9 58	34.1 65	33.1 69	32.1 67	31.4 62	31.3 53	31.7 44	32.7 34	34.2 27	36.1 24
39	RA DEC	11 48 14 34	54.6 72	55.5 68	56.0 67	56.2 68	56.1 71	55.7 74	55.4 76	55.1 77	54.9 76	55.0 73	55.5 67	56.3 61	57.3 54
40	RA DEC	11 53 53 42	40.1 23	41.4 23	42.2 27	42.4 35	42.1 42	41.4 47	40.6 48	40.0 45	39.6 38	39.7 29	40.3 19	41.4 11	42.9 05
41	RA DEC	12 15 -17 31	39.5 26	40.5 33	41.0 39	41.3 43	41.2 46	41.0 46	40.6 44	40.3 42	40.0 38	40.0 36	40.4 35	41.2 38	42.3 44
42	RA DEC	12 26 -63 04	27.3 38	29.0 46	30.0 55	30.4 65	30.2 74	29.5 80	28.5 82	27.4 80	26.6 73	26.3 65	27.0 57	28.4 54	30.2 56
43	RA DEC	12 31 -57 05	1.0 30	2.5 37	3.4 46	3.8 56	3.7 64	3.2 70	2.4 71	1.5 69	0.8 62	0.7 55	1.2 48	2.4 45	4.0 48
44	RA DEC	12 47 -59 40	33.7 02	35.3 08	36.3 17	36.9 27	36.9 36	36.3 42	35.5 44	34.6 42	33.7 36	33.4 29	33.9 21	35.1 18	36.8 19
45	RA DEC	12 53 55 58	52.8 18	54.3 16	55.3 19	55.9 26	55.8 35	55.2 42	54.4 45	53.5 43	52.9 37	52.6 28	52.8 18	53.8 08	55.2 00
46	RA DEC	13 23 54 55	47.1 73	48.5 70	49.6 72	50.2 79	50.3 88	49.8 95	49.1 99	48.2 99	47.5 94	47.0 86	47.1 75	47.9 65	49.2 56
47	RA DEC	13 25 -11 08	2.0 39	3.0 45	3.7 50	4.2 53	4.3 54	4.2 54	4.0 52	3.6 50	3.2 48	3.1 47	3.2 47	3.8 50	4.8 56
48	RA DEC	13 47 49 19	24.1 29	25.4 25	26.5 26	27.1 32	27.3 40	27.0 48	26.4 53	25.7 54	25.0 50	24.5 43	24.5 33	25.1 23	26.2 13
49	RA DEC	14 03 -60 21	36.7 11	38.4 14	39.8 20	40.8 29	41.3 38	41.2 45	40.6 50	39.6 50	38.6 47	37.9 40	38.0 33	38.8 27	40.4 26
50	RA DEC	14 06 -36 21	30.2 04	31.3 09	32.2 15	33.0 21	33.3 27	33.3 31	33.0 32	32.5 32	32.0 29	31.6 24	31.6 20	32.2 18	33.3 20

Table 10a(5). Apparent places of stars, 1997 (degrees) - continued

Star No.	Right Ascension (Hr Min) Declination (° ')		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH											
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
			Seconds (time of RA or arc of declination)											
51	RA	14 15	30.8	31.7	32.5	33.2	33.4	33.4	33.1	32.7	32.3	31.9	31.9	32.3
	DEC	19 11	50	44	42	43	47	53	57	59	58	55	49	41
52	RA	14 39	23.2	25.0	26.4	27.6	28.2	28.2	27.7	26.7	25.6	24.8	24.6	25.3
	DEC	-60 49	02	04	10	18	26	34	38	40	37	32	24	18
53	RA	14 50	42.2	43.2	44.0	44.7	45.2	45.3	45.2	44.9	44.4	44.0	43.9	44.3
	DEC	-16 01	36	41	45	48	50	50	50	48	47	45	45	46
54	RA	14 50	38.3	40.8	43.2	45.1	45.8	45.3	43.7	41.5	39.2	37.3	36.3	36.6
	DEC	74 09	53	48	49	55	64	74	80	82	79	72	61	50
55	RA	15 34	32.5	33.4	34.3	35.1	35.6	35.8	35.7	35.3	34.7	34.2	33.9	34.0
	DEC	26 43	28	21	19	20	25	33	39	43	43	41	35	27
56	RA	16 00	8.4	9.4	10.3	11.2	11.8	12.2	12.3	12.0	11.5	11.0	10.7	10.9
	DEC	-22 36	36	39	42	45	46	47	48	48	47	45	44	44
57	RA	16 29	12.3	13.2	14.2	15.1	15.9	16.3	16.5	16.3	15.8	15.2	14.8	14.9
	DEC	-26 25	20	21	23	26	28	29	30	31	30	29	27	26
58	RA	16 48	18.0	19.9	22.0	24.3	26.2	27.3	27.5	26.9	25.4	23.8	22.6	22.5
	DEC	-69 00	64	59	59	62	68	75	83	89	92	90	84	77
59	RA	17 10	11.2	11.9	12.8	13.7	14.5	15.0	15.3	15.2	14.8	14.2	13.8	13.7
	DEC	-15 43	07	09	11	12	12	11	10	09	09	09	08	09
60	RA	17 33	22.8	23.7	24.6	25.8	26.7	27.5	27.9	27.8	27.3	26.6	26.1	26.0
	DEC	-37 05	55	53	53	54	56	58	60	63	64	64	62	60
61	RA	17 34	46.4	47.1	47.8	48.7	49.5	50.1	50.3	50.2	49.8	49.2	48.7	48.6
	DEC	12 33	50	44	40	40	43	48	54	59	62	62	60	55
62	RA	17 56	30.0	30.7	31.7	32.9	34.0	34.7	34.9	34.6	33.8	32.7	31.7	31.2
	DEC	51 29	27	17	11	10	15	24	34	43	48	49	45	37
63	RA	18 23	56.8	57.5	58.3	59.4	60.4	61.3	61.8	61.9	61.6	60.9	60.3	60.0
	DEC	-34 22	61	59	58	57	57	58	59	62	64	65	64	62
64	RA	18 36	48.6	49.1	49.8	50.8	51.8	52.6	53.0	52.9	52.4	51.6	50.9	50.4
	DEC	38 46	59	50	44	42	46	54	63	72	77	79	77	71
65	RA	18 55	3.3	3.8	4.5	5.5	6.5	7.3	7.9	8.1	7.9	7.3	6.7	6.4
	DEC	-26 17	55	54	53	52	50	49	49	49	51	52	52	52
66	RA	19 50	37.0	37.3	37.8	38.6	39.5	40.3	40.9	41.2	41.1	40.6	40.0	39.7
	DEC	08 51	45	40	37	36	39	44	50	56	60	62	61	58
67	RA	20 25	22.0	22.3	23.0	24.3	25.8	27.3	28.5	29.1	29.1	28.4	27.3	26.5
	DEC	-56 44	42	35	28	22	18	18	20	25	31	37	39	37
68	RA	20 41	18.6	18.5	18.9	19.8	20.8	21.9	22.8	23.2	23.0	22.4	21.6	20.8
	DEC	45 16	25	15	08	03	03	08	17	27	37	43	45	43
69	RA	21 41	2.4	1.7	2.3	4.4	7.4	10.8	13.9	16.1	16.6	15.5	13.0	10.3
	DEC	-77 23	82	72	63	53	46	43	45	51	60	68	73	73
70	RA	21 44	1.5	1.5	1.7	2.2	3.0	3.9	4.7	5.3	5.5	5.3	4.9	4.4
	DEC	09 51	47	43	40	39	41	46	52	58	63	66	67	65
71	RA	22 08	1.0	0.8	1.0	1.6	2.6	3.8	5.0	6.0	6.4	6.2	5.5	4.8
	DEC	-46 58	40	35	29	21	14	09	07	09	13	19	25	27
72	RA	22 57	28.2	27.9	27.9	28.3	29.0	29.9	30.9	31.8	32.3	32.3	32.0	31.5
	DEC	-29 37	85	83	79	73	67	60	56	54	56	59	64	67
73	RA	23 04	36.4	36.1	36.1	36.3	37.0	37.8	38.8	39.6	40.0	40.0	39.8	39.4
	DEC	15 11	27	23	19	17	18	22	28	35	41	45	47	47

Table 10b(1). Apparent places of stars, 1993 (mils of declination)

Star No.	Right Ascension (Hr Min) Declination (Mils)	ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
		Seconds (time of RA or arc of declination)												
1	RA 00 08 DEC 516	2.4 0.55	2.0 0.53	1.8 0.51	1.9 0.49	2.4 0.48	3.3 0.49	4.4 0.51	5.4 0.55	6.0 0.59	6.3 0.62	6.2 0.64	6.0 0.65	5.5 0.65
2	RA 00 08 DEC 1050	49.0 0.98	48.1 0.96	47.6 0.93	47.7 0.89	48.5 0.86	49.8 0.85	51.4 0.86	52.9 0.90	53.9 0.95	54.2 1.00	54.0 1.04	53.4 1.07	52.5 1.08
3	RA 00 25 DEC - 1373	23.3 1.18	20.7 1.15	19.2 1.11	18.8 1.05	19.8 1.00	22.1 0.96	25.0 0.93	28.1 0.93	30.5 0.96	31.3 1.00	30.4 1.05	28.2 1.08	25.5 1.08
4	RA 00 25 DEC - 752	57.1 0.82	56.6 0.81	56.2 0.79	56.2 0.75	56.7 0.71	57.5 0.66	58.6 0.63	59.8 0.62	60.6 0.63	61.0 0.66	60.8 0.69	60.4 0.72	59.8 0.73
5	RA 00 40 DEC 1004	7.8 0.54	6.9 0.53	6.4 0.50	6.3 0.46	6.9 0.43	8.0 0.41	9.5 0.42	11.0 0.46	12.1 0.50	12.6 0.55	12.6 0.59	12.2 0.62	11.4 0.63
6	RA 00 43 DEC - 320	15.3 0.45	14.9 0.45	14.7 0.45	14.7 0.42	15.0 0.40	15.7 0.36	16.7 0.33	17.6 0.31	18.4 0.30	18.7 0.31	18.7 0.33	18.5 0.35	18.2 0.36
7	RA 00 56 DEC 1078	18.6 0.85	17.6 0.84	16.8 0.81	16.6 0.78	17.2 0.74	18.5 0.72	20.1 0.73	21.7 0.76	23.0 0.80	23.7 0.85	23.8 0.89	23.4 0.93	22.5 0.94
8	RA 01 25 DEC 1070	23.3 0.32	22.3 0.31	21.5 0.29	21.2 0.25	21.5 0.22	22.7 0.19	24.2 0.19	25.9 0.22	27.3 0.26	28.2 0.30	28.5 0.35	28.2 0.38	27.5 0.40
9	RA 01 37 DEC - 1018	28.5 0.23	27.4 0.23	26.6 0.21	26.1 0.16	26.2 0.11	26.9 0.06	28.1 0.02	29.5 0.00	30.8 0.01	31.5 0.04	31.7 0.09	31.2 0.13	30.4 0.15
10	See Table 11a. Apparent places of Polaris, 1993													
11	RA 02 06 DEC 416	48.4 0.58	48.0 0.57	47.6 0.56	47.4 0.55	47.5 0.54	48.1 0.54	49.0 0.55	50.0 0.58	50.9 0.61	51.6 0.63	51.9 0.64	52.0 0.65	51.8 0.65
12	RA 02 57 DEC - 716	61.5 1.07	60.9 1.08	60.2 1.08	59.6 1.05	59.4 1.01	59.7 0.96	60.5 0.92	61.5 0.89	62.6 0.88	63.4 0.89	63.9 0.93	63.9 0.97	63.6 1.01
13	RA 03 01 DEC 72	56.7 0.24	56.3 0.23	55.9 0.22	55.6 0.22	55.5 0.23	55.9 0.25	56.6 0.27	57.5 0.29	58.4 0.31	59.1 0.32	59.6 0.32	59.8 0.31	59.7 0.30
14	RA 03 23 DEC 885	52.2 1.05	51.6 1.06	50.9 1.06	50.3 1.03	50.1 1.01	50.5 0.99	51.5 0.97	52.9 0.98	54.2 1.00	55.3 1.02	56.2 1.05	56.6 1.08	56.5 1.10
15	RA 04 35 DEC 293	33.5 0.27	33.3 0.26	32.9 0.26	32.4 0.25	32.1 0.25	32.2 0.25	32.8 0.26	33.6 0.27	34.6 0.29	35.4 0.29	36.2 0.29	36.7 0.29	36.9 0.29
16	RA 05 14 DEC - 145	14.4 0.96	14.2 0.98	13.8 1.00	13.2 1.00	12.9 0.98	12.8 0.96	13.2 0.94	13.9 0.91	14.7 0.89	15.6 0.89	16.3 0.90	16.9 0.93	17.2 0.96
17	RA 05 16 DEC 817	13.7 0.64	13.5 0.66	12.9 0.67	12.2 0.66	11.6 0.64	11.6 0.62	12.2 0.60	13.2 0.59	14.4 0.59	15.6 0.60	16.8 0.60	17.6 0.62	18.0 0.64
18	RA 05 24 DEC 112	47.7 0.77	47.6 0.76	47.3 0.75	46.7 0.75	46.4 0.75	46.3 0.76	46.7 0.78	47.4 0.79	48.3 0.80	49.1 0.81	49.9 0.80	50.5 0.79	50.9 0.77
19	RA 05 25 DEC 508	53.7 0.48	53.7 0.49	53.2 0.49	52.6 0.49	52.2 0.48	52.2 0.47	52.6 0.46	53.4 0.46	54.4 0.47	55.4 0.47	56.3 0.47	57.1 0.48	57.5 0.48
20	RA 05 35 DEC - 21	53.9 0.45	53.8 0.47	53.4 0.48	52.9 0.49	52.5 0.48	52.4 0.46	52.7 0.44	53.4 0.42	54.2 0.41	55.0 0.40	55.8 0.42	56.5 0.44	56.8 0.46
21	RA 05 40 DEC - 34	26.7 0.61	26.6 0.63	26.2 0.64	25.7 0.64	25.3 0.64	25.2 0.62	25.5 0.60	26.1 0.58	27.0 0.56	27.8 0.56	28.6 0.57	29.3 0.59	29.6 0.62
22	RA 05 54 DEC 131	50.0 0.65	50.0 0.64	49.7 0.63	49.2 0.63	48.7 0.63	48.6 0.64	48.9 0.65	49.6 0.67	50.4 0.68	51.2 0.68	52.1 0.67	52.8 0.65	53.2 0.64
23	RA 06 23 DEC - 936	50.5 0.77	50.2 0.81	49.5 0.84	48.4 0.85	47.4 0.84	46.8 0.80	46.7 0.76	47.2 0.71	48.2 0.68	49.3 0.67	50.6 0.69	51.5 0.73	51.9 0.79
24	RA 06 37 DEC 291	21.1 0.63	21.2 0.63	20.9 0.63	20.4 0.63	19.9 0.63	19.7 0.63	19.9 0.63	20.5 0.64	21.2 0.64	22.1 0.64	23.0 0.63	23.9 0.61	24.5 0.60
25	RA 06 44 DEC - 296	52.8 1.02	52.8 1.06	52.5 1.08	51.9 1.08	51.4 1.08	51.1 1.06	51.2 1.03	51.6 1.00	52.3 0.98	53.2 0.97	54.1 0.99	54.8 1.02	55.3 1.06

Table 10b(1). Apparent places of stars, 1993 (mils of declination) - continued

Star No.	Right Ascen- sion (Hr Min) Declina- tion (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
26	RA DEC	06 58 - 514	23.4 0.90	23.5 0.95	23.1 0.97	22.5 0.99	21.9 0.98	21.5 0.95	21.5 0.92	21.9 0.88	22.6 0.85	23.4 0.84	24.4 0.86	25.2 0.90	25.8 0.94
27	RA DEC	07 08 - 468	8.8 1.03	8.9 1.07	8.6 1.10	8.0 1.11	7.4 1.11	7.0 1.08	7.0 1.05	7.3 1.02	8.0 0.99	8.8 0.98	9.8 0.99	10.6 1.03	11.2 1.07
28	RA DEC	07 34 567	12.1 0.15	12.4 0.15	12.2 0.16	11.7 0.17	11.2 0.18	10.8 0.17	10.8 0.16	11.3 0.15	12.0 0.13	12.9 0.12	13.9 0.10	14.9 0.09	15.8 0.09
29	RA DEC	07 38 93	58.6 0.18	58.8 0.16	58.7 0.16	58.2 0.15	57.8 0.16	57.4 0.16	57.5 0.17	57.8 0.18	58.4 0.19	59.1 0.19	60.0 0.17	60.9 0.15	61.6 0.12
30	RA DEC	07 44 498	56.0 0.51	56.4 0.51	56.2 0.52	55.8 0.53	55.2 0.53	54.8 0.53	54.8 0.52	55.2 0.51	55.9 0.50	56.7 0.48	57.7 0.47	58.7 0.46	59.6 0.45
31	RA DEC	08 09 - 841	21.6 0.17	21.9 0.23	21.6 0.27	20.8 0.30	20.0 0.30	19.2 0.28	18.9 0.25	19.0 0.21	19.5 0.17	20.4 0.15	21.5 0.15	22.7 0.19	23.5 0.23
32	RA DEC	08 22 - 1057	25.3 0.54	25.5 0.60	25.1 0.64	24.1 0.68	22.9 0.69	21.8 0.67	21.1 0.64	21.0 0.60	21.6 0.56	22.7 0.53	24.1 0.53	25.6 0.56	26.6 0.60
33	RA DEC	09 07 - 771	46.7 0.62	47.2 0.68	47.2 0.72	46.7 0.76	46.0 0.77	45.3 0.76	44.9 0.74	44.8 0.70	45.0 0.66	45.7 0.63	46.8 0.63	47.9 0.66	49.0 0.70
34	RA DEC	09 13 - 1238	11.1 0.88	11.8 0.94	11.5 0.99	10.3 1.04	8.6 1.06	6.8 1.06	5.5 1.03	4.9 0.99	5.1 0.94	6.3 0.91	8.3 0.90	10.4 0.91	12.1 0.96
35	RA DEC	09 27 - 153	16.7 0.42	17.3 0.45	17.4 0.47	17.1 0.49	16.7 0.49	16.3 0.48	16.1 0.47	16.1 0.45	16.4 0.43	16.9 0.43	17.7 0.44	18.6 0.47	19.6 0.50
36	RA DEC	10 08 213	1.9 0.30	2.6 0.28	2.9 0.28	2.8 0.28	2.4 0.29	2.0 0.30	1.8 0.30	1.7 0.30	1.9 0.30	2.3 0.29	3.0 0.27	4.0 0.24	5.0 0.21
37	RA DEC	11 01 1002	27.4 0.90	28.7 0.91	29.3 0.94	29.3 0.98	28.7 1.01	27.8 1.03	27.0 1.02	26.5 0.99	26.4 0.95	26.8 0.91	27.7 0.86	29.0 0.82	30.6 0.81
38	RA DEC	11 03 1098	20.2 0.35	21.7 0.36	22.4 0.39	22.3 0.42	21.6 0.46	20.5 0.47	19.5 0.47	18.9 0.44	18.7 0.40	19.1 0.35	20.1 0.30	21.6 0.26	23.4 0.25
39	RA DEC	11 48 259	43.5 0.69	44.4 0.66	45.0 0.66	45.2 0.66	45.0 0.68	44.7 0.69	44.4 0.70	44.1 0.70	44.0 0.70	44.1 0.68	44.6 0.65	45.4 0.62	46.4 0.59
40	RA DEC	11 53 955	29.3 0.15	30.6 0.15	31.4 0.17	31.6 0.20	31.3 0.24	30.5 0.26	29.8 0.26	29.1 0.25	28.8 0.21	28.8 0.17	29.4 0.12	30.5 0.08	32.0 0.05
41	RA DEC	12 15 - 311	28.0 0.18	28.9 0.21	29.5 0.24	29.8 0.26	29.8 0.27	29.6 0.28	29.2 0.27	28.9 0.26	28.7 0.24	28.7 0.23	29.2 0.22	30.0 0.24	31.0 0.27
42	RA DEC	12 26 - 1121	13.9 0.02	15.6 0.05	16.7 0.10	17.2 0.15	17.0 0.20	16.4 0.23	15.4 0.24	14.4 0.22	13.6 0.19	13.4 0.15	14.2 0.12	15.6 0.10	17.5 0.11
43	RA DEC	12 30 - 1014	47.9 0.60	49.4 0.64	50.4 0.68	50.9 0.73	50.8 0.78	50.3 0.80	49.5 0.81	48.7 0.80	48.1 0.77	48.0 0.73	48.6 0.70	49.8 0.68	51.4 0.70
44	RA DEC	12 47 - 1060	19.8 0.40	21.5 0.43	22.6 0.47	23.2 0.53	23.2 0.57	22.7 0.60	22.0 0.61	21.1 0.60	20.3 0.57	20.0 0.54	20.6 0.50	21.8 0.48	23.6 0.49
45	RA DEC	12 53 995	43.9 0.40	45.4 0.39	46.4 0.40	47.0 0.44	46.8 0.48	46.2 0.51	45.4 0.53	44.6 0.52	43.9 0.49	43.6 0.45	43.8 0.39	44.7 0.34	46.2 0.30
46	RA DEC	13 23 976	38.9 0.98	40.3 0.97	41.4 0.98	42.1 1.01	42.1 1.06	41.6 1.09	40.9 1.11	40.0 1.11	39.2 1.09	38.8 1.05	38.9 0.99	39.6 0.94	40.9 0.90
47	RA DEC	13 24 - 197	50.3 0.79	51.3 0.82	52.0 0.85	52.5 0.86	52.7 0.87	52.6 0.87	52.4 0.86	52.1 0.85	51.7 0.84	51.5 0.83	51.7 0.84	52.4 0.85	53.4 0.88
48	RA DEC	13 47 877	16.0 0.20	17.3 0.18	18.3 0.18	19.0 0.21	19.2 0.25	18.9 0.29	18.3 0.31	17.5 0.31	16.8 0.29	16.3 0.26	16.3 0.21	16.9 0.16	18.1 0.12
49	RA DEC	14 03 - 1072	20.1 0.65	22.0 0.66	23.4 0.70	24.5 0.74	25.0 0.79	24.9 0.82	24.4 0.84	23.5 0.84	22.5 0.82	21.9 0.80	22.0 0.76	23.0 0.73	24.6 0.72
50	RA DEC	14 06 - 645	16.8 0.95	18.0 0.97	19.0 1.00	19.7 1.03	20.1 1.05	20.1 1.07	19.9 1.08	19.4 1.08	18.9 1.06	18.5 1.04	18.6 1.02	19.3 1.01	20.4 1.02

Table 10b(1). Apparent places of stars, 1993 (mils of declination) - continued

Star No.	Right Ascension (Hr Min) Declination (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
51	RA DEC	14 15 341	20.9 0.60	21.9 0.58	22.7 0.57	23.3 0.57	23.6 0.59	23.6 0.62	23.3 0.64	22.9 0.65	22.5 0.64	22.1 0.63	22.1 0.60	22.6 0.57	23.4 0.52
52	RA DEC	14 39 - 1080	7.5 0.96	9.4 0.97	10.9 0.99	12.1 1.03	12.8 1.07	12.8 1.11	12.4 1.13	11.5 1.14	10.4 1.13	9.6 1.10	9.5 1.06	10.3 1.03	11.8 1.02
53	RA DEC	14 50 - 284	29.8 0.68	30.8 0.70	31.7 0.72	32.5 0.74	32.9 0.75	33.1 0.75	33.0 0.74	32.7 0.74	32.2 0.73	31.9 0.72	31.8 0.72	32.2 0.72	33.1 0.74
54	RA DEC	14 50 1318	40.1 0.73	42.6 0.70	44.9 0.71	46.8 0.74	47.5 0.78	46.9 0.83	45.3 0.86	43.0 0.87	40.6 0.86	38.7 0.82	37.6 0.77	37.8 0.72	39.4 0.67
55	RA DEC	15 34 475	23.2 0.29	24.2 0.25	25.1 0.24	26.0 0.25	26.5 0.28	26.7 0.31	26.6 0.34	26.2 0.36	25.6 0.37	25.1 0.36	24.8 0.33	25.0 0.29	25.6 0.24
56	RA DEC	15 59 - 401	55.2 0.81	56.2 0.82	57.2 0.83	58.1 0.85	58.8 0.86	59.1 0.86	59.2 0.86	59.0 0.86	58.5 0.85	58.0 0.85	57.8 0.84	58.0 0.84	58.7 0.84
57	RA DEC	16 28 - 469	58.6 0.62	59.6 0.63	60.6 0.64	61.6 0.65	62.3 0.66	62.8 0.66	63.0 0.66	62.8 0.67	62.4 0.67	61.8 0.66	61.5 0.65	61.6 0.64	62.2 0.64
58	RA DEC	16 47 - 1226	54.0 0.90	56.0 0.88	58.2 0.88	60.6 0.89	62.5 0.92	63.6 0.96	63.9 0.99	63.3 1.02	61.9 1.04	60.4 1.03	59.3 1.00	59.2 0.96	60.4 0.92
59	RA DEC	17 09 - 279	58.4 0.40	59.3 0.41	60.1 0.42	61.1 0.43	61.9 0.43	62.5 0.42	62.7 0.41	62.7 0.41	62.3 0.40	61.7 0.40	61.3 0.40	61.3 0.40	61.8 0.41
60	RA DEC	17 33 - 659	7.7 0.53	8.6 0.52	9.7 0.52	10.8 0.52	11.8 0.53	12.6 0.54	13.0 0.55	13.0 0.56	12.5 0.57	11.9 0.56	11.3 0.55	11.2 0.54	11.7 0.52
61	RA DEC	17 34 223	36.2 0.37	36.8 0.33	37.6 0.32	38.6 0.32	39.3 0.33	39.9 0.36	40.2 0.39	40.1 0.42	39.7 0.43	39.1 0.43	38.7 0.42	38.5 0.40	38.9 0.37
62	RA DEC	17 56 915	24.9 0.36	25.6 0.31	26.6 0.28	27.8 0.28	28.9 0.31	29.7 0.35	29.9 0.40	29.6 0.45	28.7 0.48	27.7 0.48	26.7 0.46	26.2 0.43	26.2 0.37
63	RA DEC	18 23 - 611	42.1 0.34	42.9 0.33	43.8 0.32	44.9 0.32	45.9 0.31	46.8 0.32	47.4 0.32	47.5 0.33	47.2 0.34	46.5 0.34	45.9 0.34	45.7 0.33	46.0 0.32
64	RA DEC	18 36 689	41.0 0.37	41.5 0.33	42.3 0.30	43.4 0.29	44.3 0.31	45.1 0.35	45.5 0.40	45.5 0.45	45.0 0.48	44.2 0.49	43.5 0.48	43.0 0.45	43.0 0.41
65	RA DEC	18 54 - 467	49.6 0.65	50.2 0.64	51.0 0.64	52.0 0.63	53.0 0.62	53.8 0.62	54.4 0.61	54.7 0.61	54.4 0.62	53.9 0.62	53.3 0.62	53.1 0.62	53.2 0.61
66	RA DEC	19 50 157	26.2 0.34	26.5 0.32	27.0 0.31	27.9 0.30	28.7 0.32	29.6 0.35	30.2 0.38	30.5 0.41	30.4 0.43	30.0 0.44	29.4 0.44	29.1 0.43	29.0 0.41
67	RA DEC	20 25 - 1008	5.1 1.05	5.4 1.01	6.2 0.97	7.5 0.94	9.0 0.92	10.5 0.92	11.7 0.93	12.4 0.95	12.3 0.98	11.6 1.01	10.6 1.02	9.8 1.01	9.5 0.98
68	RA DEC	20 41 804	10.7 0.60	10.7 0.55	11.1 0.52	12.0 0.49	13.1 0.49	14.2 0.52	15.1 0.57	15.5 0.62	15.4 0.67	14.8 0.70	14.0 0.71	13.3 0.70	12.8 0.67
69	RA DEC	21 40 - 1376	40.4 0.42	39.6 0.38	40.3 0.33	42.4 0.28	45.4 0.24	48.8 0.23	51.8 0.24	54.0 0.27	54.5 0.31	53.3 0.35	50.7 0.37	48.0 0.37	46.0 0.34
70	RA DEC	21 43 174	50.6 1.02	50.6 1.00	50.8 0.99	51.3 0.98	52.1 0.99	53.1 1.02	53.9 1.05	54.6 1.09	54.8 1.11	54.6 1.13	54.2 1.13	53.8 1.12	53.5 1.11
71	RA DEC	22 07 - 835	47.6 0.50	47.4 0.47	47.6 0.44	48.3 0.40	49.3 0.36	50.5 0.34	51.7 0.33	52.7 0.33	53.1 0.36	52.9 0.38	52.3 0.41	51.6 0.42	51.1 0.41
72	RA DEC	22 57 - 527	16.3 0.30	16.1 0.28	16.1 0.27	16.5 0.23	17.2 0.20	18.1 0.17	19.2 0.15	20.1 0.14	20.6 0.14	20.6 0.16	20.2 0.18	19.8 0.20	19.4 0.20
73	RA DEC	23 04 269	25.2 0.70	25.0 0.68	25.0 0.66	25.3 0.65	25.9 0.66	26.8 0.68	27.8 0.71	28.6 0.75	29.1 0.78	29.1 0.80	28.9 0.81	28.5 0.81	28.2 0.79

Table 10b(2). Apparent places of stars, 1994 (mils of declination)

Star No.	Right Ascension (Hr Min) Declination (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
1	RA DEC	00 08 516	5.5 0.65	5.1 0.63	4.9 0.61	5.0 0.58	5.5 0.58	6.4 0.58	7.4 0.61	8.4 0.64	9.0 0.68	9.3 0.71	9.2 0.74	8.9 0.74	8.5 0.74
2	RA DEC	00 08 1050	52.5 1.08	51.6 1.06	51.0 1.02	51.1 0.98	51.9 0.95	53.2 0.94	54.8 0.96	56.2 0.99	57.2 1.04	57.6 1.09	57.3 1.14	56.7 1.16	55.8 1.17
3	RA DEC	00 25 - 1373	25.5 1.08	22.9 1.06	21.4 1.01	20.9 0.96	21.9 0.91	24.2 0.86	27.2 0.84	30.3 0.84	32.6 0.87	33.5 0.91	32.6 0.96	30.5 0.99	27.6 0.99
4	RA DEC	00 25 - 752	59.8 0.73	59.3 0.73	58.9 0.70	58.9 0.66	59.3 0.62	60.2 0.57	61.3 0.54	62.4 0.53	63.2 0.54	63.6 0.57	63.5 0.60	63.0 0.63	62.4 0.65
5	RA DEC	00 40 1004	11.4 0.63	10.5 0.62	9.9 0.59	9.8 0.55	10.4 0.52	11.6 0.50	13.0 0.51	14.5 0.54	15.6 0.59	16.1 0.64	16.1 0.68	15.6 0.71	14.9 0.72
6	RA DEC	00 43 - 320	18.2 0.36	17.8 0.37	17.5 0.36	17.5 0.34	17.8 0.31	18.5 0.27	19.4 0.24	20.4 0.22	21.1 0.21	21.5 0.22	21.5 0.24	21.3 0.26	20.9 0.27
7	RA DEC	00 56 1078	22.5 0.94	21.4 0.93	20.7 0.90	20.5 0.86	21.0 0.83	22.3 0.81	23.8 0.81	25.5 0.84	26.7 0.88	27.4 0.93	27.5 0.98	27.1 1.01	26.2 1.03
8	RA DEC	01 25 1070	27.5 0.40	26.4 0.40	25.6 0.37	25.2 0.33	25.6 0.30	26.8 0.28	28.3 0.28	29.9 0.30	31.3 0.34	32.2 0.38	32.5 0.43	32.2 0.46	31.5 0.48
9	RA DEC	01 37 - 1017	30.4 1.15	29.3 1.15	28.5 1.13	28.0 1.08	28.0 1.03	28.8 0.98	29.9 0.94	31.3 0.92	32.6 0.93	33.4 0.96	33.5 1.00	33.1 1.05	32.2 1.07
10	See Table 11b. Apparent places of Polaris, 1994														
11	RA DEC	02 06 416	51.8 0.65	51.4 0.65	50.9 0.63	50.7 0.62	50.8 0.61	51.4 0.61	52.2 0.63	53.2 0.65	54.2 0.68	54.8 0.70	55.2 0.72	55.2 0.72	55.0 0.73
12	RA DEC	02 58 - 716	3.6 1.01	3.0 1.02	2.3 1.02	1.7 0.99	1.5 0.95	1.8 0.90	2.5 0.86	3.5 0.83	4.6 0.82	5.4 0.83	5.9 0.87	5.9 0.91	5.6 0.95
13	RA DEC	03 01 72	59.7 0.30	59.4 0.29	58.9 0.28	58.6 0.28	58.5 0.29	58.9 0.30	59.6 0.33	60.5 0.35	61.4 0.37	62.1 0.38	62.5 0.38	62.7 0.36	62.7 0.35
14	RA DEC	03 23 886	56.5 0.10	55.9 0.11	55.2 0.10	54.5 0.08	54.4 0.06	54.8 0.03	55.7 0.02	57.0 0.02	58.4 0.04	59.5 0.07	60.3 0.10	60.7 0.13	60.7 0.15
15	RA DEC	04 35 293	36.9 0.29	36.7 0.28	36.2 0.28	35.7 0.27	35.4 0.27	35.5 0.27	36.0 0.28	36.8 0.29	37.8 0.30	38.7 0.31	39.4 0.31	39.9 0.31	40.1 0.31
16	RA DEC	05 14 - 145	17.2 0.96	17.0 0.98	16.5 0.99	16.0 0.99	15.6 0.98	15.6 0.96	15.9 0.93	16.6 0.90	17.4 0.89	18.3 0.88	19.0 0.90	19.6 0.92	19.8 0.95
17	RA DEC	05 16 817	18.0 0.64	17.8 0.66	17.2 0.67	16.4 0.66	15.9 0.65	15.9 0.62	16.4 0.61	17.4 0.60	18.6 0.59	19.8 0.60	20.9 0.61	21.8 0.63	22.2 0.65
18	RA DEC	05 24 112	50.9 0.77	50.8 0.76	50.4 0.75	49.8 0.75	49.4 0.75	49.4 0.76	49.7 0.78	50.4 0.80	51.3 0.80	52.1 0.81	52.9 0.80	53.5 0.79	53.9 0.77
19	RA DEC	05 25 508	57.5 0.48	57.3 0.49	56.9 0.49	56.3 0.48	55.9 0.48	55.8 0.47	56.2 0.46	57.0 0.46	58.0 0.47	59.0 0.47	59.9 0.47	60.6 0.48	61.0 0.48
20	RA DEC	05 35 - 21	56.8 0.46	56.7 0.48	56.3 0.49	55.8 0.49	55.4 0.48	55.3 0.47	55.6 0.45	56.2 0.42	57.0 0.41	57.9 0.41	58.7 0.42	59.3 0.44	59.6 0.46
21	RA DEC	05 40 - 34	29.6 0.62	29.5 0.64	29.1 0.65	28.6 0.65	28.2 0.64	28.1 0.63	28.4 0.61	29.0 0.58	29.8 0.57	30.6 0.57	31.4 0.58	32.1 0.60	32.4 0.62
22	RA DEC	05 54 131	53.2 0.64	53.2 0.62	52.8 0.62	52.3 0.62	51.8 0.62	51.7 0.63	52.0 0.64	52.6 0.65	53.4 0.67	54.3 0.67	55.1 0.66	55.8 0.64	56.2 0.63
23	RA DEC	06 23 - 936	51.9 0.79	51.6 0.84	50.8 0.87	49.7 0.88	48.7 0.86	48.1 0.83	48.0 0.78	48.5 0.74	49.4 0.70	50.6 0.69	51.8 0.71	52.7 0.76	53.1 0.81
24	RA DEC	06 37 291	24.5 0.60	24.5 0.60	24.2 0.60	23.7 0.60	23.2 0.60	23.0 0.60	23.2 0.60	23.7 0.61	24.5 0.61	25.4 0.61	26.3 0.60	27.1 0.59	27.7 0.58
25	RA DEC	06 44 - 297	55.3 0.06	55.3 0.10	55.0 0.12	54.4 0.12	53.9 0.12	53.6 0.10	53.7 0.07	54.1 0.04	54.8 0.02	55.7 0.01	56.5 0.03	57.3 0.06	57.8 0.10

Table 10b(2). Apparent places of stars, 1994 (mils of declination) - continued

Star No.	Right Ascension (Hr Min) Declination (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
26	RA DEC	06 58 - 514	25.8 0.94	25.8 0.98	25.4 1.01	24.8 1.02	24.2 1.02	23.8 0.99	23.8 0.96	24.1 0.92	24.8 0.89	25.7 0.88	26.6 0.89	27.4 0.93	28.0 0.98
27	RA DEC	07 08 - 469	11.2 0.07	11.3 0.11	10.9 0.14	10.3 0.15	9.7 0.15	9.3 0.13	9.3 0.09	9.6 0.06	10.3 0.03	11.1 0.02	12.1 0.03	12.9 0.07	13.5 0.11
28	RA DEC	07 34 567	15.8 0.09	16.1 0.10	15.9 0.11	15.3 0.12	14.8 0.12	14.4 0.12	14.4 0.11	14.8 0.10	15.5 0.08	16.4 0.07	17.4 0.06	18.4 0.05	19.3 0.04
29	RA DEC	07 39 93	1.6 0.12	1.9 0.11	1.7 0.10	1.2 0.09	0.7 0.10	0.4 0.11	0.4 0.12	0.7 0.13	1.3 0.13	2.1 0.13	3.0 0.12	3.8 0.09	4.5 0.07
30	RA DEC	07 44 498	59.6 0.45	59.9 0.45	59.7 0.46	59.2 0.47	58.7 0.47	58.3 0.47	58.3 0.46	58.6 0.45	59.3 0.44	60.1 0.43	61.1 0.42	62.1 0.40	62.9 0.40
31	RA DEC	08 09 - 841	23.5 0.23	23.8 0.29	23.4 0.33	22.7 0.36	21.8 0.37	21.1 0.35	20.7 0.31	20.8 0.27	21.3 0.23	22.2 0.21	23.4 0.21	24.5 0.24	25.3 0.29
32	RA DEC	08 22 - 1057	26.6 0.60	26.9 0.66	26.5 0.71	25.5 0.74	24.3 0.75	23.2 0.74	22.5 0.71	22.4 0.66	22.9 0.62	24.0 0.59	25.4 0.59	26.9 0.61	27.9 0.67
33	RA DEC	09 07 - 771	49.0 0.70	49.5 0.76	49.4 0.80	48.9 0.84	48.2 0.85	47.5 0.84	47.1 0.82	46.9 0.78	47.2 0.74	47.9 0.71	49.0 0.71	50.1 0.73	51.1 0.78
34	RA DEC	09 13 - 1238	12.1 0.96	12.8 1.02	12.5 1.07	11.3 1.12	9.6 1.14	7.8 1.14	6.5 1.11	5.8 1.07	6.1 1.02	7.3 0.99	9.2 0.97	11.3 0.99	13.0 1.04
35	RA DEC	09 27 - 153	19.6 0.50	20.1 0.54	20.2 0.56	20.0 0.57	19.6 0.57	19.2 0.57	18.9 0.55	18.9 0.53	19.2 0.52	19.7 0.51	20.5 0.52	21.4 0.55	22.3 0.58
36	RA DEC	10 08 213	5.0 0.21	5.7 0.20	5.9 0.19	5.8 0.19	5.5 0.20	5.0 0.21	4.8 0.21	4.7 0.22	4.8 0.21	5.3 0.20	6.0 0.18	6.9 0.15	7.9 0.13
37	RA DEC	11 01 1002	30.6 0.81	31.9 0.82	32.5 0.84	32.4 0.88	31.8 0.91	31.0 0.93	30.2 0.92	29.6 0.90	29.5 0.86	29.9 0.81	30.8 0.77	32.1 0.74	33.7 0.72
38	RA DEC	11 03 1098	23.4 0.25	24.9 0.26	25.6 0.29	25.5 0.33	24.7 0.37	23.7 0.38	22.7 0.38	22.0 0.35	21.8 0.31	22.2 0.26	23.2 0.21	24.7 0.17	26.5 0.16
39	RA DEC	11 48 259	46.4 0.59	47.3 0.57	47.9 0.56	48.0 0.57	47.9 0.58	47.6 0.60	47.2 0.61	46.9 0.61	46.8 0.60	46.9 0.59	47.4 0.56	48.2 0.53	49.2 0.50
40	RA DEC	11 53 954	32.0 1.05	33.4 1.05	34.1 1.07	34.3 1.11	34.0 1.14	33.3 1.17	32.5 1.17	31.8 1.16	31.5 1.12	31.5 1.08	32.1 1.03	33.2 0.98	34.7 0.96
41	RA DEC	12 15 - 311	31.0 0.27	32.0 0.30	32.6 0.33	32.9 0.36	32.8 0.37	32.6 0.37	32.2 0.36	31.9 0.35	31.7 0.33	31.7 0.32	32.1 0.32	32.9 0.33	33.9 0.36
42	RA DEC	12 26 - 1121	17.5 0.11	19.2 0.15	20.3 0.19	20.8 0.24	20.6 0.29	20.0 0.32	19.0 0.33	17.9 0.31	17.1 0.28	17.0 0.24	17.6 0.20	19.0 0.19	20.9 0.20
43	RA DEC	12 30 - 1014	51.4 0.70	52.9 0.73	53.9 0.78	54.3 0.82	54.3 0.86	53.8 0.89	53.0 0.90	52.2 0.89	51.5 0.86	51.4 0.82	51.9 0.79	53.2 0.77	54.8 0.79
44	RA DEC	12 47 - 1060	23.6 0.49	25.2 0.52	26.3 0.57	26.9 0.62	26.9 0.66	26.4 0.69	25.6 0.70	24.7 0.69	23.9 0.66	23.7 0.63	24.2 0.59	25.4 0.57	27.1 0.58
45	RA DEC	12 53 995	46.2 0.30	47.6 0.30	48.7 0.31	49.2 0.35	49.1 0.39	48.5 0.42	47.6 0.44	46.8 0.43	46.1 0.40	45.8 0.36	46.1 0.30	46.9 0.25	48.3 0.22
46	RA DEC	13 23 976	40.9 0.90	42.4 0.88	43.5 0.89	44.1 0.93	44.1 0.97	43.7 1.01	42.9 1.03	42.0 1.03	41.2 1.00	40.8 0.96	40.9 0.91	41.6 0.86	42.9 0.82
47	RA DEC	13 24 - 197	53.4 0.88	54.4 0.91	55.1 0.93	55.6 0.95	55.8 0.95	55.7 0.95	55.4 0.94	55.0 0.93	54.7 0.92	54.5 0.92	54.7 0.92	55.3 0.93	56.3 0.96
48	RA DEC	13 47 877	18.1 0.12	19.4 0.10	20.4 0.10	21.1 0.13	21.2 0.17	20.9 0.21	20.3 0.23	19.6 0.23	18.8 0.22	18.4 0.19	18.4 0.14	18.9 0.08	20.1 0.04
49	RA DEC	14 03 - 1072	24.6 0.72	26.3 0.74	27.8 0.77	28.9 0.81	29.4 0.85	29.3 0.89	28.7 0.91	27.8 0.92	26.8 0.90	26.2 0.87	26.3 0.83	27.2 0.80	28.8 0.80
50	RA DEC	14 06 - 646	20.4 0.02	21.5 0.04	22.5 0.07	23.2 0.10	23.6 0.13	23.6 0.15	23.3 0.16	22.9 0.15	22.3 0.14	22.0 0.12	22.0 0.09	22.7 0.08	23.7 0.09

Table 10b(2). Apparent places of stars, 1994 (mils of declination) - continued

Star No.	Right Ascension (Hr Min) Declination (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
51	RA DEC	14 15 341	23.4 0.52	24.4 0.49	25.2 0.48	25.9 0.49	26.1 0.51	26.1 0.54	25.9 0.56	25.5 0.57	25.0 0.57	24.7 0.55	24.6 0.52	25.1 0.49	25.9 0.44
52	RA DEC	14 39 - 1081	11.8 0.02	13.5 0.03	15.0 0.05	16.3 0.09	16.9 0.13	17.0 0.17	16.5 0.19	15.5 0.20	14.5 0.19	13.7 0.16	13.5 0.12	14.2 0.09	15.8 0.08
53	RA DEC	14 50 - 284	33.1 0.74	34.1 0.76	34.9 0.78	35.7 0.80	36.1 0.80	36.3 0.80	36.2 0.80	35.9 0.80	35.4 0.79	35.0 0.78	35.0 0.78	35.3 0.78	36.2 0.80
54	RA DEC	14 50 1318	39.4 0.67	41.9 0.64	44.3 0.64	46.2 0.68	46.9 0.72	46.3 0.77	44.7 0.80	42.4 0.81	40.1 0.80	38.1 0.77	37.1 0.71	37.3 0.66	38.9 0.61
55	RA DEC	15 34 475	25.6 0.24	26.6 0.21	27.5 0.20	28.3 0.20	28.8 0.23	29.1 0.27	28.9 0.30	28.5 0.32	28.0 0.32	27.4 0.31	27.1 0.28	27.3 0.24	27.9 0.20
56	RA DEC	15 59 - 401	58.7 0.84	59.7 0.86	60.6 0.87	61.5 0.88	62.2 0.89	62.6 0.90	62.7 0.90	62.4 0.89	61.9 0.89	61.4 0.88	61.1 0.87	61.3 0.87	62.0 0.88
57	RA DEC	16 29 - 469	2.2 0.64	3.2 0.65	4.1 0.66	5.1 0.67	5.9 0.68	6.4 0.69	6.5 0.69	6.3 0.69	5.9 0.69	5.3 0.68	4.9 0.67	5.0 0.67	5.7 0.67
58	RA DEC	16 48 - 1226	0.4 0.92	2.3 0.90	4.5 0.89	6.8 0.91	8.7 0.94	9.9 0.97	10.1 1.01	9.5 1.04	8.1 1.05	6.5 1.04	5.4 1.01	5.3 0.97	6.4 0.94
59	RA DEC	17 10 - 279	1.8 0.41	2.6 0.42	3.4 0.43	4.4 0.43	5.2 0.43	5.8 0.43	6.0 0.42	5.9 0.41	5.5 0.41	5.0 0.41	4.5 0.41	4.5 0.41	5.0 0.42
60	RA DEC	17 33 - 659	11.7 0.52	12.6 0.52	13.6 0.51	14.7 0.52	15.7 0.52	16.5 0.53	16.9 0.54	16.8 0.56	16.4 0.56	15.7 0.56	15.1 0.55	15.0 0.54	15.5 0.52
61	RA DEC	17 34 223	38.9 0.37	39.5 0.34	40.3 0.32	41.2 0.32	42.0 0.34	42.6 0.36	42.8 0.39	42.7 0.42	42.3 0.44	41.8 0.44	41.3 0.42	41.1 0.40	41.4 0.37
62	RA DEC	17 56 915	26.2 0.37	26.9 0.32	27.9 0.30	29.1 0.29	30.2 0.32	31.0 0.36	31.2 0.41	30.9 0.46	30.0 0.49	29.0 0.49	28.0 0.47	27.5 0.44	27.5 0.38
63	RA DEC	18 23 - 611	46.0 0.32	46.7 0.30	47.6 0.30	48.7 0.29	49.7 0.29	50.6 0.29	51.1 0.30	51.2 0.31	50.9 0.32	50.3 0.32	49.7 0.32	49.4 0.31	49.7 0.29
64	RA DEC	18 36 689	43.0 0.41	43.5 0.36	44.3 0.33	45.3 0.32	46.3 0.34	47.1 0.38	47.5 0.43	47.4 0.48	46.9 0.51	46.2 0.52	45.4 0.51	44.9 0.48	44.9 0.44
65	RA DEC	18 54 - 467	53.2 0.61	53.8 0.61	54.5 0.60	55.5 0.60	56.5 0.59	57.4 0.58	57.9 0.58	58.1 0.58	57.9 0.59	57.4 0.59	56.8 0.59	56.5 0.59	56.6 0.58
66	RA DEC	19 50 157	29.0 0.41	29.3 0.38	29.8 0.37	30.6 0.36	31.5 0.38	32.4 0.41	33.0 0.44	33.3 0.47	33.2 0.49	32.8 0.50	32.2 0.50	31.8 0.48	31.8 0.46
67	RA DEC	20 25 - 1008	9.5 0.98	9.8 0.94	10.5 0.91	11.8 0.87	13.3 0.85	14.8 0.85	16.0 0.86	16.6 0.88	16.6 0.91	15.9 0.94	14.9 0.95	14.0 0.94	13.7 0.91
68	RA DEC	20 41 804	12.8 0.67	12.8 0.63	13.2 0.59	14.0 0.56	15.1 0.57	16.3 0.60	17.1 0.64	17.5 0.69	17.4 0.74	16.8 0.77	16.0 0.78	15.3 0.77	14.8 0.74
69	RA DEC	21 40 - 1376	46.0 0.34	45.2 0.29	45.9 0.24	47.9 0.19	50.8 0.16	54.3 0.14	57.3 0.15	59.4 0.18	59.9 0.22	58.8 0.26	56.3 0.29	53.5 0.29	51.4 0.26
70	RA DEC	21 43 175	53.5 0.11	53.4 0.09	53.6 0.07	54.2 0.07	55.0 0.08	55.9 0.11	56.7 0.14	57.3 0.17	57.6 0.20	57.4 0.21	57.0 0.21	56.5 0.20	56.2 0.19
71	RA DEC	22 07 - 835	51.1 0.41	50.9 0.38	51.1 0.35	51.7 0.31	52.7 0.27	53.9 0.25	55.1 0.24	56.0 0.24	56.4 0.27	56.3 0.30	55.6 0.32	54.9 0.33	54.4 0.32
72	RA DEC	22 57 - 527	19.4 0.20	19.1 0.19	19.2 0.17	19.5 0.14	20.2 0.11	21.2 0.08	22.2 0.05	23.0 0.04	23.6 0.05	23.6 0.07	23.3 0.09	22.8 0.11	22.4 0.11
73	RA DEC	23 04 269	28.2 0.79	27.9 0.77	27.9 0.76	28.2 0.75	28.8 0.75	29.7 0.77	30.6 0.80	31.4 0.84	31.9 0.87	32.0 0.89	31.7 0.90	31.3 0.90	31.0 0.89

Table 10b(3). Apparent places of stars, 1995 (mils of declination)

Star No.	Right Ascen- sion (Hr Min) Decl- ination (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
1	RA DEC	00 08 516	8.5 0.74	8.1 0.72	7.9 0.70	7.9 0.68	8.4 0.67	9.3 0.67	10.3 0.70	11.3 0.73	11.9 0.77	12.2 0.80	12.1 0.82	11.8 0.83	11.4 0.82
2	RA DEC	00 08 1051	55.8 0.17	54.9 0.15	54.3 0.12	54.3 0.07	55.0 0.04	56.4 0.03	58.0 0.05	59.4 0.08	60.3 0.13	60.7 0.18	60.5 0.22	59.8 0.25	58.9 0.25
3	RA DEC	00 25 - 1373	27.6 0.99	25.1 0.97	23.6 0.93	23.2 0.87	24.1 0.82	26.4 0.77	29.4 0.75	32.5 0.75	34.9 0.78	35.7 0.82	34.9 0.87	32.8 0.90	30.0 0.90
4	RA DEC	00 26 - 752	2.4 0.65	1.9 0.64	1.5 0.61	1.5 0.57	1.9 0.53	2.7 0.49	3.8 0.45	5.0 0.44	5.8 0.45	6.1 0.48	6.0 0.51	5.6 0.54	5.0 0.56
5	RA DEC	00 40 1004	14.9 0.72	14.0 0.71	13.4 0.68	13.2 0.64	13.8 0.61	14.9 0.59	16.4 0.60	17.8 0.63	18.9 0.68	19.4 0.72	19.4 0.77	18.9 0.80	18.1 0.80
6	RA DEC	00 43 - 320	20.9 0.27	20.5 0.28	20.3 0.27	20.2 0.25	20.5 0.22	21.2 0.19	22.2 0.15	23.1 0.13	23.8 0.12	24.2 0.13	24.2 0.15	24.0 0.17	23.6 0.18
7	RA DEC	00 56 1078	26.2 1.03	25.1 1.02	24.4 0.99	24.1 0.95	24.6 0.91	25.9 0.90	27.4 0.90	29.0 0.93	30.3 0.97	31.0 1.02	31.1 1.07	30.6 1.10	29.7 1.11
8	RA DEC	01 25 1070	31.5 0.48	30.4 0.48	29.6 0.45	29.1 0.41	29.5 0.38	30.6 0.36	32.1 0.36	33.8 0.38	35.1 0.41	36.0 0.46	36.3 0.51	36.0 0.54	35.2 0.56
9	RA DEC	01 37 - 1017	32.2 1.07	31.2 1.07	30.4 1.05	29.8 1.00	29.8 0.96	30.6 0.90	31.8 0.86	33.2 0.85	34.4 0.85	35.2 0.89	35.4 0.93	34.9 0.97	34.1 1.00
10	See Table 11c. Apparent places of Polaris, 1995														
11	RA DEC	02 06 416	55.0 0.73	54.6 0.72	54.1 0.71	53.8 0.69	53.9 0.68	54.5 0.68	55.4 0.70	56.4 0.72	57.3 0.75	57.9 0.77	58.3 0.79	58.3 0.80	58.1 0.80
12	RA DEC	02 58 - 716	5.6 0.95	5.0 0.97	4.3 0.96	3.7 0.94	3.5 0.90	3.8 0.85	4.5 0.80	5.5 0.78	6.6 0.77	7.4 0.78	7.9 0.81	7.9 0.85	7.6 0.89
13	RA DEC	03 02 72	2.7 0.35	2.3 0.34	1.9 0.34	1.5 0.33	1.4 0.34	1.7 0.36	2.4 0.38	3.3 0.40	4.2 0.42	4.9 0.43	5.4 0.43	5.6 0.42	5.5 0.40
14	RA DEC	03 23 886	60.7 0.15	60.1 0.16	59.3 0.15	58.6 0.13	58.4 0.10	58.8 0.08	59.8 0.07	61.1 0.07	62.4 0.09	63.5 0.11	64.4 0.15	64.7 0.18	64.6 0.20
15	RA DEC	04 35 293	40.1 0.31	39.9 0.30	39.5 0.30	38.9 0.29	38.6 0.29	38.7 0.29	39.2 0.30	40.0 0.32	40.9 0.33	41.8 0.34	42.6 0.34	43.1 0.33	43.2 0.33
16	RA DEC	05 14 - 145	19.8 0.95	19.7 0.97	19.2 0.98	18.6 0.98	18.2 0.97	18.2 0.95	18.5 0.92	19.2 0.90	20.0 0.88	20.9 0.87	21.6 0.89	22.2 0.91	22.4 0.94
17	RA DEC	05 16 817	22.2 0.65	22.0 0.67	21.4 0.67	20.5 0.67	20.0 0.65	20.0 0.63	20.5 0.61	21.4 0.60	22.6 0.60	23.9 0.60	25.0 0.61	25.8 0.63	26.2 0.65
18	RA DEC	05 24 112	53.9 0.77	53.8 0.76	53.4 0.76	52.8 0.75	52.4 0.76	52.3 0.77	52.7 0.78	53.3 0.80	54.2 0.81	55.0 0.81	55.9 0.80	56.5 0.80	56.8 0.78
19	RA DEC	05 25 508	61.0 0.48	60.9 0.49	60.4 0.49	59.8 0.49	59.3 0.48	59.3 0.47	59.7 0.47	60.5 0.47	61.4 0.47	62.4 0.47	63.4 0.48	64.0 0.48	64.4 0.49
20	RA DEC	05 35 - 21	59.6 0.46	59.6 0.48	59.2 0.49	58.6 0.49	58.2 0.48	58.1 0.47	58.4 0.45	59.0 0.42	59.8 0.41	60.6 0.41	61.5 0.42	62.1 0.44	62.4 0.46
21	RA DEC	05 40 - 34	32.4 0.62	32.4 0.64	32.0 0.65	31.4 0.65	30.9 0.65	30.8 0.63	31.1 0.61	31.7 0.59	32.5 0.57	33.4 0.57	34.2 0.58	34.8 0.60	35.1 0.62
22	RA DEC	05 54 131	56.2 0.63	56.2 0.61	55.8 0.61	55.2 0.61	54.8 0.61	54.7 0.62	55.0 0.63	55.5 0.65	56.3 0.66	57.2 0.66	58.1 0.65	58.7 0.64	59.1 0.62
23	RA DEC	06 23 - 936	53.1 0.81	52.8 0.86	52.1 0.89	50.9 0.90	49.9 0.88	49.3 0.85	49.2 0.80	49.7 0.76	50.7 0.72	51.8 0.71	53.1 0.73	54.0 0.77	54.3 0.82
24	RA DEC	06 37 291	27.7 0.58	27.8 0.57	27.5 0.57	26.9 0.57	26.4 0.58	26.2 0.58	26.4 0.58	26.9 0.59	27.6 0.59	28.5 0.59	29.4 0.58	30.2 0.57	30.8 0.56
25	RA DEC	06 44 - 297	57.8 0.10	57.8 0.13	57.5 0.15	56.9 0.16	56.3 0.15	56.0 0.13	56.1 0.10	56.5 0.07	57.2 0.05	58.0 0.04	58.9 0.06	59.7 0.09	60.2 0.13

Table 10b(3). Apparent places of stars, 1995 (mils of declination) - continued

Star No.	Right Ascen- sion (Hr Min) Declina- tion (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
26	RA DEC	06 58 - 514	28.0 0.98	28.0 1.02	27.6 1.05	27.0 1.06	26.3 1.05	26.0 1.03	25.9 0.99	26.3 0.95	26.9 0.92	27.8 0.91	28.8 0.93	29.6 0.96	30.1 1.01
27	RA DEC	07 08 - 469	13.5 0.11	13.6 0.15	13.2 0.18	12.6 0.19	12.0 0.19	11.6 0.16	11.6 0.13	11.9 0.09	12.5 0.06	13.3 0.05	14.3 0.07	15.1 0.10	15.7 0.15
28	RA DEC	07 34 567	19.3 0.04	19.6 0.05	19.4 0.06	18.8 0.07	18.2 0.08	17.8 0.07	17.9 0.06	18.2 0.05	18.9 0.04	19.8 0.02	20.9 0.01	21.9 0.00	22.7 0.00
29	RA DEC	07 39 93	4.5 0.07	4.8 0.05	4.6 0.04	4.1 0.04	3.6 0.04	3.3 0.05	3.3 0.06	3.6 0.07	4.1 0.08	4.9 0.08	5.8 0.06	6.7 0.04	7.3 0.02
30	RA DEC	07 45 498	2.9 0.40	3.3 0.40	3.1 0.41	2.5 0.42	2.0 0.42	1.6 0.42	1.6 0.41	1.9 0.41	2.5 0.40	3.4 0.39	4.4 0.37	5.4 0.36	6.2 0.35
31	RA DEC	08 09 - 841	25.3 0.29	25.6 0.35	25.3 0.39	24.5 0.42	23.6 0.42	22.9 0.41	22.5 0.37	22.5 0.33	23.1 0.29	23.9 0.26	25.1 0.27	26.2 0.30	27.1 0.35
32	RA DEC	08 22 - 1057	27.9 0.67	28.2 0.73	27.8 0.77	26.7 0.81	25.5 0.82	24.4 0.80	23.8 0.77	23.6 0.72	24.1 0.68	25.2 0.65	26.7 0.65	28.1 0.67	29.1 0.73
33	RA DEC	09 07 - 771	51.1 0.78	51.6 0.83	51.6 0.88	51.0 0.91	50.3 0.92	49.7 0.92	49.2 0.89	49.1 0.85	49.3 0.81	50.0 0.79	51.0 0.78	52.2 0.80	53.2 0.85
34	RA DEC	09 13 - 1239	13.0 0.04	13.7 0.09	13.4 0.15	12.2 0.19	10.5 0.21	8.7 0.21	7.4 0.19	6.7 0.15	6.9 0.10	8.1 0.06	10.0 0.05	12.1 0.06	13.8 0.11
35	RA DEC	09 27 - 153	22.3 0.58	22.9 0.61	23.0 0.63	22.7 0.65	22.3 0.65	21.9 0.64	21.6 0.62	21.6 0.61	21.8 0.59	22.4 0.59	23.2 0.60	24.1 0.62	25.0 0.65
36	RA DEC	10 08 213	7.9 0.13	8.6 0.11	8.9 0.10	8.7 0.11	8.3 0.12	7.9 0.12	7.7 0.13	7.6 0.14	7.7 0.13	8.1 0.12	8.9 0.10	9.8 0.07	10.7 0.04
37	RA DEC	11 01 1002	33.7 0.72	35.0 0.73	35.6 0.76	35.5 0.79	34.9 0.82	34.0 0.84	33.3 0.83	32.7 0.81	32.6 0.78	32.9 0.73	33.9 0.68	35.2 0.65	36.7 0.63
38	RA DEC	11 03 1098	26.5 0.16	28.0 0.17	28.7 0.20	28.6 0.24	27.8 0.27	26.8 0.29	25.8 0.28	25.1 0.26	24.9 0.21	25.3 0.17	26.3 0.12	27.8 0.08	29.6 0.07
39	RA DEC	11 48 259	49.2 0.50	50.1 0.48	50.7 0.47	50.8 0.48	50.7 0.49	50.3 0.51	50.0 0.52	49.7 0.52	49.5 0.52	49.6 0.50	50.1 0.47	50.9 0.44	51.9 0.41
40	RA DEC	11 53 954	34.7 0.96	36.0 0.96	36.8 0.98	37.0 1.02	36.6 1.05	35.9 1.08	35.2 1.08	34.5 1.07	34.1 1.03	34.2 0.99	34.8 0.94	35.9 0.89	37.3 0.87
41	RA DEC	12 15 - 311	33.9 0.36	34.9 0.40	35.5 0.42	35.7 0.45	35.7 0.46	35.5 0.46	35.1 0.45	34.8 0.44	34.5 0.42	34.5 0.41	35.0 0.41	35.7 0.42	36.7 0.45
42	RA DEC	12 26 - 1121	20.9 0.20	22.7 0.23	23.7 0.28	24.2 0.33	24.0 0.38	23.3 0.41	22.4 0.42	21.3 0.40	20.4 0.37	20.3 0.33	20.9 0.29	22.3 0.28	24.2 0.29
43	RA DEC	12 30 - 1014	54.8 0.79	56.3 0.82	57.2 0.86	57.6 0.91	57.6 0.95	57.1 0.98	56.3 0.99	55.4 0.98	54.8 0.95	54.6 0.91	55.2 0.87	56.4 0.86	58.0 0.87
44	RA DEC	12 47 - 1060	27.1 0.58	28.7 0.61	29.8 0.65	30.4 0.70	30.4 0.75	29.9 0.78	29.1 0.79	28.1 0.78	27.3 0.75	27.1 0.71	27.6 0.68	28.8 0.66	30.5 0.67
45	RA DEC	12 53 995	48.3 0.22	49.9 0.21	50.9 0.22	51.4 0.26	51.2 0.30	50.7 0.34	49.9 0.35	49.0 0.34	48.3 0.32	48.0 0.27	48.3 0.22	49.2 0.17	50.5 0.14
46	RA DEC	13 23 976	42.9 0.82	44.4 0.80	45.5 0.81	46.1 0.85	46.1 0.89	45.7 0.93	44.9 0.95	44.1 0.95	43.3 0.92	42.8 0.88	42.9 0.83	43.7 0.78	44.9 0.74
47	RA DEC	13 24 - 197	56.3 0.96	57.3 0.99	58.0 1.01	58.5 1.02	58.7 1.03	58.6 1.03	58.4 1.02	58.0 1.01	57.6 1.00	57.4 1.00	57.6 1.00	58.2 1.01	59.2 1.04
48	RA DEC	13 47 876	20.1 1.04	21.4 1.02	22.4 1.02	23.1 1.05	23.2 1.10	22.9 1.13	22.4 1.16	21.6 1.16	20.8 1.15	20.4 1.11	20.4 1.06	21.0 1.01	22.0 0.96
49	RA DEC	14 03 - 1072	28.8 0.80	30.6 0.81	32.0 0.84	33.0 0.88	33.5 0.93	33.4 0.96	32.9 0.99	31.9 0.99	30.9 0.97	30.3 0.94	30.3 0.90	31.2 0.87	32.8 0.87
50	RA DEC	14 06 - 646	23.7 0.09	24.9 0.12	25.9 0.15	26.5 0.18	26.9 0.20	26.9 0.22	26.7 0.23	26.2 0.23	25.6 0.21	25.3 0.19	25.4 0.17	25.9 0.16	27.0 0.17

Table 10b(3). Apparent places of stars, 1995 (mils of declination) - continued

Star No.	Right Ascension (Hr Min) Declination (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
51	RA DEC	14 15 - 341	25.9 0.44	26.9 0.41	27.7 0.40	28.3 0.41	28.6 0.43	28.6 0.46	28.3 0.48	27.9 0.49	27.4 0.49	27.1 0.47	27.1 0.44	27.5 0.40	28.3 0.36
52	RA DEC	14 39 - 1081	15.8 0.08	17.6 0.09	19.0 0.11	20.2 0.15	20.8 0.19	20.9 0.22	20.4 0.25	19.4 0.26	18.3 0.24	17.5 0.21	17.4 0.18	18.1 0.15	19.5 0.14
53	RA DEC	14 50 - 284	36.2 0.80	37.2 0.82	38.1 0.84	38.8 0.85	39.2 0.86	39.4 0.86	39.3 0.86	38.9 0.85	38.4 0.84	38.1 0.84	38.0 0.83	38.4 0.84	39.2 0.86
54	RA DEC	14 50 1318	38.9 0.61	41.4 0.58	43.7 0.58	45.7 0.62	46.4 0.66	45.8 0.71	44.2 0.74	42.0 0.75	39.6 0.74	37.7 0.71	36.6 0.65	36.9 0.60	38.5 0.55
55	RA DEC	15 34 475	27.9 0.20	28.9 0.17	29.8 0.15	30.6 0.16	31.1 0.19	31.3 0.22	31.2 0.25	30.8 0.27	30.2 0.28	29.7 0.26	29.4 0.23	29.6 0.20	30.2 0.16
56	RA DEC	16 00 - 401	2.0 0.88	3.0 0.89	3.9 0.91	4.8 0.92	5.4 0.93	5.9 0.93	5.9 0.93	5.7 0.93	5.2 0.93	4.7 0.92	4.4 0.91	4.6 0.91	5.2 0.92
57	RA DEC	16 29 - 469	5.7 0.67	6.6 0.68	7.6 0.69	8.5 0.70	9.3 0.70	9.8 0.71	9.9 0.72	9.7 0.72	9.2 0.71	8.7 0.71	8.3 0.70	8.4 0.69	9.0 0.69
58	RA DEC	16 48 - 1226	6.4 0.94	8.4 0.91	10.5 0.91	12.8 0.93	14.6 0.95	15.8 0.99	16.1 1.03	15.4 1.06	14.0 1.07	12.5 1.06	11.3 1.03	11.2 0.99	12.2 0.96
59	RA DEC	17 10 - 279	5.0 0.42	5.8 0.43	6.6 0.44	7.5 0.44	8.3 0.44	8.9 0.43	9.2 0.43	9.1 0.42	8.6 0.42	8.1 0.42	7.7 0.42	7.7 0.42	8.1 0.43
60	RA DEC	17 33 - 659	15.5 0.52	16.4 0.51	17.4 0.51	18.5 0.52	19.4 0.52	20.2 0.53	20.6 0.54	20.6 0.56	20.1 0.56	19.4 0.56	18.9 0.55	18.7 0.54	19.2 0.52
61	RA DEC	17 34 223	41.4 0.37	42.1 0.34	42.9 0.32	43.8 0.32	44.5 0.34	45.1 0.36	45.4 0.39	45.3 0.42	44.8 0.43	44.3 0.44	43.8 0.42	43.6 0.40	43.9 0.37
62	RA DEC	17 56 915	27.5 0.38	28.2 0.33	29.2 0.31	30.4 0.30	31.5 0.33	32.2 0.37	32.5 0.42	32.1 0.47	31.3 0.50	30.3 0.50	29.3 0.48	28.7 0.44	28.8 0.39
63	RA DEC	18 23 - 611	49.7 0.29	50.4 0.28	51.2 0.28	52.3 0.27	53.3 0.27	54.2 0.27	54.8 0.28	54.8 0.29	54.5 0.30	53.9 0.30	53.3 0.30	53.0 0.29	53.2 0.28
64	RA DEC	18 36 689	44.9 0.44	45.4 0.39	46.2 0.36	47.2 0.35	48.2 0.37	49.0 0.41	49.4 0.46	49.3 0.50	48.8 0.53	48.1 0.55	47.3 0.53	46.8 0.50	46.8 0.46
65	RA DEC	18 54 - 467	56.6 0.58	57.2 0.58	57.9 0.57	58.9 0.57	59.8 0.56	60.7 0.55	61.3 0.55	61.5 0.55	61.3 0.56	60.7 0.56	60.2 0.56	59.8 0.56	60.0 0.56
66	RA DEC	19 50 157	31.8 0.46	32.1 0.44	32.6 0.42	33.3 0.42	34.2 0.43	35.1 0.46	35.7 0.49	36.0 0.52	35.8 0.54	35.4 0.55	34.9 0.55	34.5 0.54	34.4 0.51
67	RA DEC	20 25 - 1008	13.7 0.91	14.0 0.88	14.8 0.84	16.0 0.81	17.4 0.80	19.0 0.79	20.2 0.80	20.8 0.82	20.8 0.85	20.1 0.88	19.1 0.89	18.2 0.88	17.8 0.85
68	RA DEC	20 41 804	14.8 0.74	14.8 0.70	15.2 0.66	16.0 0.63	17.1 0.63	18.2 0.66	19.1 0.71	19.5 0.76	19.3 0.80	18.8 0.83	18.0 0.85	17.2 0.83	16.7 0.80
69	RA DEC	21 40 - 1376	51.4 0.26	50.7 0.21	51.3 0.16	53.3 0.11	56.2 0.08	59.6 0.06	62.7 0.07	64.8 0.10	65.3 0.14	64.2 0.18	61.7 0.21	59.0 0.21	56.8 0.18
70	RA DEC	21 43 175	56.2 0.19	56.2 0.17	56.4 0.16	56.9 0.15	57.7 0.16	58.6 0.19	59.5 0.22	60.0 0.25	60.2 0.27	60.1 0.29	59.7 0.29	59.2 0.28	58.9 0.27
71	RA DEC	22 07 - 835	54.4 0.32	54.2 0.29	54.4 0.26	55.0 0.22	56.0 0.19	57.2 0.17	58.4 0.16	59.4 0.16	59.7 0.19	59.6 0.21	59.0 0.24	58.2 0.25	57.7 0.24
72	RA DEC	22 57 - 526	22.4 1.11	22.1 1.10	22.1 1.08	22.5 1.05	23.1 1.02	24.1 0.99	25.1 0.96	26.0 0.95	26.5 0.96	26.5 0.98	26.2 1.00	25.7 1.02	25.3 1.02
73	RA DEC	23 04 269	31.0 0.89	30.7 0.87	30.7 0.85	31.0 0.84	31.6 0.84	32.5 0.86	33.4 0.90	34.2 0.93	34.6 0.96	34.7 0.98	34.5 0.99	34.1 0.99	33.7 0.98

Table 10b(4). Apparent places of stars, 1996 (mils of declination)

Star No.	Right Ascension (Hr Min) Declination (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
1	RA DEC	00 08 516	11.4 0.82	11.0 0.81	10.7 0.79	10.8 0.76	11.3 0.75	12.1 0.76	13.2 0.79	14.1 0.82	14.7 0.85	15.0 0.89	14.9 0.91	14.6 0.92	14.2 0.91
2	RA DEC	00 08 1051	58.9 0.25	58.0 0.23	57.4 0.20	57.4 0.16	58.1 0.13	59.5 0.12	61.0 0.14	62.4 0.17	63.3 0.21	63.7 0.26	63.5 0.31	62.8 0.34	61.8 0.34
3	RA DEC	00 25 - 1373	30.0 0.90	27.5 0.88	26.0 0.84	25.6 0.78	26.6 0.72	28.9 0.68	31.9 0.66	35.1 0.66	37.4 0.69	38.3 0.73	37.4 0.78	35.4 0.81	32.6 0.81
4	RA DEC	00 26 - 752	5.0 0.56	4.4 0.55	4.1 0.53	4.0 0.49	4.5 0.44	5.3 0.40	6.4 0.37	7.6 0.36	8.4 0.37	8.7 0.40	8.6 0.43	8.2 0.46	7.6 0.47
5	RA DEC	00 40 1004	18.1 0.80	17.2 0.80	16.6 0.76	16.4 0.72	17.0 0.69	18.2 0.68	19.6 0.69	21.0 0.72	22.0 0.77	22.5 0.81	22.5 0.85	22.1 0.88	21.2 0.89
6	RA DEC	00 43 - 320	23.6 0.18	23.2 0.19	22.9 0.18	22.9 0.16	23.2 0.13	23.9 0.10	24.8 0.07	25.8 0.04	26.5 0.03	26.8 0.04	26.9 0.06	26.6 0.08	26.2 0.10
7	RA DEC	00 56 1078	29.7 1.11	28.6 1.10	27.8 1.07	27.5 1.03	28.0 1.00	29.3 0.98	30.9 0.99	32.5 1.01	33.7 1.06	34.3 1.10	34.4 1.15	33.9 1.19	33.0 1.20
8	RA DEC	01 25 1070	35.2 0.56	34.2 0.56	33.3 0.53	32.9 0.49	33.2 0.46	34.3 0.43	35.9 0.44	37.5 0.46	38.8 0.50	39.6 0.54	39.9 0.59	39.6 0.62	38.8 0.64
9	RA DEC	01 37 - 1017	34.1 1.00	33.0 1.00	32.2 0.97	31.7 0.93	31.7 0.88	32.5 0.82	33.7 0.78	35.1 0.77	36.4 0.78	37.1 0.81	37.3 0.85	36.8 0.89	36.0 0.92
10	See Table 11d. Apparent places of Polaris, 1996														
11	RA DEC	02 06 416	58.1 0.80	57.7 0.79	57.2 0.78	56.9 0.76	57.0 0.75	57.6 0.76	58.5 0.77	59.5 0.80	60.4 0.82	61.0 0.84	61.3 0.86	61.4 0.87	61.1 0.87
12	RA DEC	02 58 - 716	7.6 0.89	7.0 0.91	6.3 0.90	5.7 0.88	5.5 0.84	5.8 0.79	6.5 0.75	7.5 0.72	8.6 0.71	9.4 0.72	9.9 0.76	9.9 0.80	9.6 0.83
13	RA DEC	03 02 72	5.5 0.40	5.1 0.40	4.7 0.39	4.3 0.39	4.2 0.40	4.6 0.41	5.3 0.44	6.2 0.46	7.0 0.48	7.7 0.49	8.2 0.49	8.4 0.48	8.3 0.46
14	RA DEC	03 24 886	4.6 0.20	4.0 0.21	3.2 0.20	2.5 0.18	2.3 0.15	2.7 0.13	3.7 0.12	5.0 0.12	6.3 0.14	7.4 0.17	8.2 0.20	8.6 0.23	8.5 0.25
15	RA DEC	04 35 293	43.2 0.33	43.0 0.33	42.5 0.32	42.0 0.32	41.7 0.32	41.8 0.32	42.3 0.33	43.1 0.34	44.0 0.35	44.9 0.36	45.6 0.36	46.1 0.36	46.3 0.36
16	RA DEC	05 14 - 145	22.4 0.94	22.3 0.96	21.8 0.97	21.2 0.97	20.8 0.96	20.8 0.94	21.1 0.91	21.8 0.88	22.6 0.86	23.4 0.86	24.2 0.88	24.8 0.90	25.0 0.93
17	RA DEC	05 16 817	26.2 0.65	26.0 0.67	25.4 0.68	24.5 0.68	24.0 0.66	24.0 0.64	24.5 0.62	25.5 0.61	26.6 0.60	27.8 0.61	29.0 0.62	29.8 0.64	30.1 0.67
18	RA DEC	05 24 112	56.8 0.78	56.7 0.77	56.2 0.76	55.7 0.76	55.3 0.76	55.2 0.77	55.6 0.79	56.3 0.80	57.1 0.82	57.9 0.82	58.7 0.81	59.3 0.80	59.6 0.79
19	RA DEC	05 26 508	4.4 0.49	4.3 0.49	3.8 0.49	3.2 0.49	2.7 0.48	2.7 0.48	3.1 0.47	3.9 0.47	4.8 0.48	5.8 0.48	6.7 0.48	7.4 0.49	7.8 0.50
20	RA DEC	05 36 - 21	2.4 0.46	2.3 0.48	1.9 0.49	1.3 0.49	0.9 0.48	0.8 0.47	1.1 0.44	1.7 0.42	2.5 0.40	3.4 0.40	4.2 0.41	4.8 0.43	5.1 0.46
21	RA DEC	05 40 - 34	35.1 0.62	35.1 0.64	34.7 0.65	34.1 0.65	33.6 0.64	33.5 0.63	33.8 0.61	34.5 0.58	35.2 0.57	36.1 0.56	36.9 0.58	37.5 0.60	37.8 0.62
22	RA DEC	05 54 131	59.1 0.62	59.1 0.61	58.7 0.60	58.2 0.60	57.7 0.61	57.6 0.61	57.9 0.63	58.5 0.64	59.3 0.65	60.1 0.66	61.0 0.65	61.6 0.63	62.0 0.62
23	RA DEC	06 23 - 936	54.3 0.82	54.0 0.87	53.2 0.90	52.1 0.91	51.1 0.90	50.5 0.86	50.4 0.82	50.9 0.77	51.9 0.74	53.1 0.73	54.3 0.75	55.2 0.79	55.5 0.84
24	RA DEC	06 37 291	30.8 0.56	30.9 0.55	30.6 0.55	30.0 0.55	29.5 0.55	29.3 0.56	29.5 0.56	30.0 0.57	30.7 0.57	31.6 0.57	32.5 0.56	33.3 0.55	33.8 0.54
25	RA DEC	06 44 - 297	60.2 0.13	60.2 0.16	59.8 0.18	59.2 0.19	58.7 0.18	58.4 0.16	58.5 0.13	58.9 0.10	59.6 0.08	60.4 0.07	61.3 0.09	62.0 0.12	62.5 0.16

Table 10b(4). Apparent places of stars, 1996 (mils of declination) - continued

Star No.	Right Ascen- sion (Hr Min) Decl- ination (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
26	RA DEC	06 58 - 514	30.1 1.01	30.2 1.05	29.8 1.08	29.1 1.09	28.4 1.08	28.1 1.06	28.1 1.02	28.4 0.98	29.1 0.95	29.9 0.94	30.9 0.95	31.7 0.99	32.2 1.03
27	RA DEC	07 08 - 469	15.7 0.15	15.8 0.19	15.4 0.21	14.8 0.22	14.2 0.21	13.8 0.20	13.8 0.16	14.1 0.12	14.7 0.09	15.5 0.08	16.5 0.10	17.3 0.13	17.9 0.18
28	RA DEC	07 34 566	22.7 1.00	23.0 1.01	22.8 1.02	22.2 1.03	21.6 1.03	21.2 1.03	21.3 1.02	21.7 1.01	22.3 1.00	23.2 0.98	24.3 0.97	25.3 0.96	26.1 0.96
29	RA DEC	07 39 92	7.3 1.02	7.6 1.00	7.4 0.99	6.9 0.99	6.4 1.00	6.1 1.00	6.1 1.01	6.4 1.03	7.0 1.03	7.7 1.03	8.6 1.02	9.5 1.00	10.1 0.97
30	RA DEC	07 45 498	6.2 0.35	6.5 0.36	6.3 0.37	5.8 0.38	5.2 0.38	4.8 0.38	4.8 0.37	5.2 0.36	5.8 0.35	6.6 0.34	7.7 0.33	8.6 0.32	9.4 0.31
31	RA DEC	08 09 - 841	27.1 0.35	27.3 0.40	27.0 0.45	26.2 0.47	25.3 0.48	24.6 0.46	24.2 0.43	24.3 0.38	24.8 0.34	25.6 0.32	26.8 0.32	27.9 0.35	28.7 0.40
32	RA DEC	08 22 - 1057	29.1 0.73	29.4 0.78	29.0 0.83	27.9 0.87	26.7 0.87	25.6 0.86	24.9 0.83	24.8 0.78	25.3 0.73	26.4 0.70	27.9 0.70	29.3 0.73	30.3 0.78
33	RA DEC	09 07 - 771	53.2 0.85	53.7 0.90	53.6 0.95	53.1 0.98	52.4 0.99	51.7 0.99	51.2 0.96	51.1 0.92	51.4 0.88	52.0 0.85	53.1 0.85	54.2 0.87	55.2 0.92
34	RA DEC	09 13 DEC - 1239	13.8 0.11	14.5 0.17	14.2 0.21	12.9 0.26	11.2 0.28	9.4 0.28	8.1 0.25	7.4 0.21	7.6 0.17	8.8 0.13	10.8 0.12	12.8 0.13	14.5 0.18
35	RA DEC	09 27 - 153	25.0 0.65	25.5 0.69	25.6 0.71	25.4 0.72	24.9 0.72	24.5 0.71	24.3 0.70	24.3 0.68	24.5 0.66	25.0 0.66	25.8 0.67	26.7 0.69	27.6 0.73
36	RA DEC	10 08 212	10.7 1.04	11.5 1.02	11.7 1.02	11.6 1.02	11.2 1.03	10.7 1.04	10.5 1.05	10.4 1.05	10.5 1.05	10.9 1.04	11.7 1.02	12.6 0.99	13.6 0.96
37	RA DEC	11 01 1002	36.7 0.63	38.0 0.64	38.7 0.67	38.6 0.71	38.0 0.74	37.1 0.76	36.3 0.75	35.8 0.73	35.7 0.69	36.0 0.64	37.0 0.59	38.3 0.56	39.9 0.54
38	RA DEC	11 03 1097	29.6 1.07	31.1 1.08	31.8 1.11	31.7 1.15	30.9 1.19	29.8 1.20	28.9 1.19	28.2 1.17	28.0 1.13	28.4 1.08	29.5 1.03	31.0 1.00	32.8 0.98
39	RA DEC	11 48 259	51.9 0.41	52.8 0.39	53.4 0.38	53.5 0.39	53.4 0.40	53.0 0.42	52.7 0.43	52.4 0.43	52.2 0.42	52.3 0.41	52.8 0.38	53.6 0.35	54.6 0.32
40	RA DEC	11 53 954	37.3 0.87	38.7 0.87	39.5 0.89	39.7 0.93	39.3 0.96	38.6 0.99	37.8 0.99	37.2 0.98	36.8 0.94	36.9 0.90	37.5 0.85	38.6 0.80	40.1 0.78
41	RA DEC	12 15 - 311	36.7 0.45	37.7 0.48	38.3 0.51	38.6 0.54	38.5 0.55	38.2 0.55	37.9 0.54	37.5 0.53	37.3 0.51	37.3 0.50	37.7 0.50	38.5 0.51	39.5 0.54
42	RA DEC	12 26 - 1121	24.2 0.29	25.9 0.32	27.0 0.37	27.4 0.42	27.2 0.47	26.5 0.50	25.5 0.51	24.4 0.49	23.6 0.46	23.4 0.42	24.1 0.38	25.5 0.36	27.3 0.37
43	RA DEC	12 30 DEC - 1014	58.0 0.87	59.5 0.91	60.4 0.95	60.8 1.00	60.7 1.04	60.2 1.07	59.4 1.08	58.5 1.07	57.9 1.03	57.7 1.00	58.3 0.96	59.5 0.95	61.0 0.96
44	RA DEC	12 47 - 1060	30.5 0.67	32.1 0.70	33.2 0.74	33.7 0.79	33.7 0.83	33.2 0.86	32.4 0.87	31.4 0.86	30.6 0.83	30.3 0.80	30.9 0.76	32.1 0.74	33.7 0.75
45	RA DEC	12 53 995	50.5 0.14	52.0 0.13	53.1 0.14	53.6 0.18	53.5 0.22	52.8 0.25	52.0 0.27	51.2 0.26	50.5 0.23	50.2 0.19	50.5 0.14	51.4 0.09	52.8 0.05
46	RA DEC	13 23 976	44.9 0.74	46.4 0.72	47.5 0.74	48.2 0.77	48.2 0.81	47.7 0.85	46.9 0.87	46.1 0.86	45.3 0.84	44.9 0.80	45.0 0.75	45.8 0.70	47.1 0.66
47	RA DEC	13 24 - 198	59.2 0.04	60.2 0.07	60.9 0.09	61.4 0.11	61.5 0.11	61.4 0.11	61.2 0.10	60.8 0.09	60.4 0.08	60.3 0.07	60.5 0.08	61.1 0.09	62.0 0.12
48	RA DEC	13 47 876	22.0 0.96	23.4 0.94	24.4 0.95	25.1 0.98	25.2 1.02	24.9 1.06	24.3 1.08	23.6 1.08	22.9 1.07	22.4 1.03	22.4 0.98	23.0 0.93	24.1 0.88
49	RA DEC	14 03 - 1072	32.8 0.87	34.6 0.88	36.0 0.91	37.0 0.96	37.4 1.00	37.4 1.04	36.8 1.06	35.8 1.06	34.8 1.04	34.2 1.01	34.2 0.97	35.1 0.95	36.7 0.94
50	RA DEC	14 06 - 646	27.0 0.17	28.2 0.19	29.1 0.22	29.8 0.25	30.1 0.28	30.1 0.30	29.9 0.31	29.4 0.30	28.8 0.29	28.5 0.27	28.5 0.25	29.1 0.24	30.2 0.24

Table 10b(4). Apparent places of stars, 1996 (mils of declination) - continued

Star No.	Right Ascen- sion (Hr Min) Declina- tion (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
51	RA DEC	14 15 341	28.3 0.36	29.3 0.33	30.2 0.32	30.8 0.33	31.0 0.35	31.0 0.38	30.7 0.40	30.3 0.41	29.8 0.41	29.5 0.39	29.5 0.36	29.9 0.32	30.8 0.28
52	RA DEC	14 39 - 1081	19.5 0.14	21.3 0.15	22.8 0.17	24.0 0.21	24.6 0.25	24.6 0.29	24.1 0.31	23.1 0.32	22.0 0.30	21.2 0.27	21.1 0.24	21.8 0.21	23.2 0.20
53	RA DEC	14 50 - 284	39.2 0.86	40.2 0.88	41.1 0.90	41.8 0.92	42.2 0.92	42.4 0.92	42.3 0.92	41.9 0.91	41.4 0.91	41.0 0.90	41.0 0.90	41.4 0.90	42.2 0.92
54	RA DEC	14 50 1318	38.5 0.55	40.9 0.52	43.4 0.52	45.3 0.56	46.0 0.60	45.4 0.65	43.8 0.68	41.6 0.69	39.3 0.68	37.4 0.64	36.4 0.59	36.6 0.53	38.3 0.48
55	RA DEC	15 34 475	30.2 0.16	31.1 0.12	32.1 0.11	32.9 0.11	33.4 0.14	33.6 0.18	33.5 0.20	33.1 0.22	32.5 0.23	31.9 0.21	31.6 0.19	31.8 0.15	32.5 0.10
56	RA DEC	16 00 - 401	5.2 0.92	6.2 0.93	7.2 0.95	8.0 0.96	8.7 0.97	9.0 0.97	9.1 0.97	8.9 0.97	8.3 0.97	7.8 0.96	7.6 0.95	7.8 0.95	8.4 0.96
57	RA DEC	16 29 - 469	9.0 0.69	10.0 0.70	10.9 0.71	11.9 0.72	12.6 0.73	13.1 0.74	13.2 0.74	13.0 0.75	12.5 0.74	11.9 0.74	11.6 0.73	11.7 0.72	12.3 0.73
58	RA DEC	16 48 - 1226	12.2 0.96	14.2 0.93	16.4 0.93	18.7 0.95	20.5 0.98	21.6 1.01	21.9 1.05	21.2 1.08	19.7 1.09	18.1 1.08	17.0 1.05	16.9 1.02	18.0 0.98
59	RA DEC	17 10 - 279	8.1 0.43	8.9 0.44	9.8 0.45	10.7 0.45	11.4 0.45	12.0 0.45	12.2 0.44	12.1 0.44	11.7 0.43	11.1 0.43	10.7 0.43	10.7 0.43	11.2 0.44
60	RA DEC	17 33 - 659	19.2 0.52	20.1 0.52	21.1 0.52	22.2 0.52	23.1 0.53	23.9 0.54	24.3 0.55	24.2 0.56	23.7 0.57	23.0 0.57	22.5 0.56	22.4 0.54	22.8 0.53
61	RA DEC	17 34 223	43.9 0.37	44.6 0.34	45.4 0.32	46.3 0.31	47.0 0.33	47.6 0.36	47.9 0.39	47.8 0.41	47.3 0.43	46.7 0.43	46.3 0.42	46.1 0.39	46.4 0.36
62	RA DEC	17 56 915	28.8 0.39	29.4 0.34	30.5 0.31	31.7 0.31	32.8 0.33	33.5 0.38	33.7 0.43	33.4 0.47	32.5 0.50	31.5 0.50	30.5 0.49	30.0 0.45	30.0 0.39
63	RA DEC	18 23 - 611	53.2 0.28	53.9 0.27	54.8 0.26	55.9 0.26	56.9 0.25	57.8 0.26	58.3 0.26	58.4 0.28	58.0 0.29	57.4 0.29	56.8 0.29	56.5 0.28	56.8 0.26
64	RA DEC	18 36 689	46.8 0.46	47.3 0.41	48.0 0.38	49.1 0.37	50.0 0.39	50.8 0.43	51.2 0.48	51.1 0.52	50.6 0.55	49.8 0.57	49.1 0.55	48.6 0.52	48.6 0.48
65	RA DEC	18 55 - 467	0.0 0.56	0.5 0.55	1.3 0.55	2.2 0.54	3.2 0.53	4.0 0.52	4.6 0.52	4.8 0.53	4.6 0.53	4.0 0.54	3.4 0.54	3.1 0.54	3.3 0.53
66	RA DEC	19 50 157	34.4 0.51	34.7 0.49	35.2 0.47	36.0 0.47	36.9 0.48	37.7 0.51	38.3 0.54	38.6 0.57	38.5 0.59	38.0 0.60	37.5 0.60	37.1 0.58	37.0 0.56
67	RA DEC	20 25 - 1008	17.8 0.85	18.1 0.82	18.9 0.79	20.2 0.76	21.6 0.74	23.1 0.73	24.3 0.74	25.0 0.77	24.9 0.80	24.2 0.82	23.2 0.83	22.4 0.82	22.0 0.80
68	RA DEC	20 41 804	16.7 0.80	16.7 0.76	17.1 0.72	17.9 0.70	19.0 0.70	20.1 0.73	21.0 0.77	21.4 0.82	21.2 0.86	20.6 0.89	19.8 0.91	19.1 0.89	18.6 0.86
69	RA DEC	21 40 - 1375	56.8 1.18	56.1 1.13	56.8 1.08	58.8 1.03	61.7 1.00	65.1 0.99	68.2 1.00	70.4 1.03	70.9 1.07	69.6 1.11	67.2 1.14	64.5 1.13	62.4 1.11
70	RA DEC	21 43 175	58.9 0.27	58.9 0.25	59.1 0.23	59.6 0.23	60.3 0.24	61.3 0.26	62.1 0.29	62.7 0.33	62.9 0.35	62.7 0.36	62.3 0.37	61.8 0.36	61.5 0.34
71	RA DEC	22 07 - 835	57.7 0.24	57.5 0.21	57.7 0.18	58.3 0.14	59.3 0.11	60.5 0.08	61.7 0.07	62.7 0.08	63.0 0.11	62.8 0.14	62.2 0.16	61.5 0.17	61.0 0.16
72	RA DEC	22 57 - 526	25.3 1.02	25.0 1.01	25.1 0.99	25.4 0.96	26.1 0.93	27.0 0.90	28.1 0.88	28.9 0.87	29.4 0.88	29.4 0.89	29.1 0.92	28.6 0.93	28.2 0.94
73	RA DEC	23 04 269	33.7 0.98	33.5 0.96	33.4 0.94	33.7 0.93	34.3 0.93	35.2 0.95	36.1 0.98	36.9 1.01	37.3 1.04	37.4 1.06	37.1 1.07	36.8 1.07	36.4 1.06

Table 10b(5). Apparent places of stars, 1997 (mils of declination)

Star No.	Right Ascension (Hr Min) Declination (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
1	RA DEC	00 08 516	14.2 0.91	13.7 0.89	13.5 0.87	13.6 0.85	14.0 0.84	14.9 0.84	15.9 0.87	16.9 0.90	17.5 0.94	17.7 0.97	17.7 1.00	17.3 1.00	16.9 1.00
2	RA DEC	00 09 1051	1.8 0.34	0.8 0.32	0.3 0.29	0.3 0.24	1.0 0.21	2.3 0.20	3.9 0.22	5.3 0.25	6.2 0.30	6.5 0.35	6.3 0.40	5.6 0.42	4.7 0.43
3	RA DEC	00 25 - 1373	32.6 0.81	30.1 0.79	28.6 0.75	28.3 0.69	29.3 0.63	31.6 0.60	34.6 0.57	37.8 0.57	40.2 0.60	41.1 0.64	40.3 0.69	38.2 0.72	35.5 0.72
4	RA DEC	00 26 - 752	7.6 0.47	7.0 0.47	6.6 0.44	6.6 0.40	7.1 0.36	7.9 0.32	9.0 0.29	10.1 0.27	11.0 0.28	11.3 0.31	11.2 0.35	10.8 0.38	10.2 0.39
5	RA DEC	00 40 1004	21.2 0.89	20.3 0.88	19.7 0.85	19.5 0.81	20.1 0.78	21.2 0.77	22.6 0.78	24.1 0.80	25.1 0.85	25.6 0.89	25.5 0.94	25.1 0.97	24.2 0.98
6	RA DEC	00 43 - 319	26.2 1.10	25.8 1.10	25.6 1.10	25.5 1.08	25.9 1.05	26.6 1.01	27.5 0.98	28.4 0.96	29.1 0.95	29.5 0.96	29.5 0.98	29.3 1.00	28.9 1.01
7	RA DEC	00 56 1079	33.0 0.20	31.9 0.19	31.1 0.16	30.8 0.12	31.3 0.08	32.5 0.07	34.1 0.07	35.7 0.10	36.9 0.14	37.5 0.19	37.6 0.23	37.1 0.27	36.2 0.28
8	RA DEC	01 25 1070	38.8 0.64	37.7 0.64	36.8 0.61	36.4 0.57	36.8 0.54	37.8 0.52	39.3 0.52	41.0 0.54	42.3 0.58	43.1 0.62	43.4 0.67	43.1 0.71	42.3 0.73
9	RA DEC	01 37 - 1017	36.0 0.92	34.9 0.92	34.1 0.89	33.6 0.85	33.7 0.80	34.4 0.74	35.6 0.71	37.0 0.69	38.3 0.69	39.1 0.73	39.2 0.77	38.8 0.81	38.0 0.84
10	See Table 11e. Apparent places of Polaris, 1997														
11	RA DEC	02 06 416	61.1 0.87	60.7 0.86	60.2 0.84	59.9 0.83	60.0 0.82	60.6 0.83	61.5 0.84	62.5 0.86	63.4 0.89	64.0 0.91	64.3 0.93	64.3 0.94	64.1 0.94
12	RA DEC	02 58 - 716	9.6 0.83	8.9 0.85	8.2 0.84	7.7 0.82	7.5 0.78	7.8 0.73	8.5 0.69	9.5 0.65	10.6 0.64	11.4 0.66	11.9 0.69	11.9 0.74	11.6 0.77
13	RA DEC	03 02 72	8.3 0.46	7.9 0.45	7.4 0.45	7.1 0.45	7.0 0.45	7.3 0.47	8.0 0.50	8.9 0.52	9.8 0.54	10.5 0.55	11.0 0.55	11.1 0.54	11.1 0.53
14	RA DEC	03 24 886	8.5 0.25	7.8 0.26	7.1 0.26	6.4 0.24	6.2 0.21	6.6 0.19	7.5 0.17	8.8 0.18	10.1 0.20	11.2 0.22	12.0 0.25	12.4 0.29	12.3 0.31
15	RA DEC	04 35 293	46.3 0.36	46.0 0.35	45.6 0.35	45.0 0.35	44.7 0.34	44.8 0.35	45.3 0.36	46.2 0.37	47.1 0.39	47.9 0.39	48.7 0.40	49.2 0.39	49.4 0.39
16	RA DEC	05 14 - 145	25.0 0.93	24.8 0.95	24.3 0.96	23.8 0.96	23.4 0.94	23.3 0.92	23.6 0.89	24.3 0.87	25.2 0.85	26.0 0.84	26.7 0.86	27.3 0.88	27.5 0.91
17	RA DEC	05 16 817	30.1 0.67	29.9 0.68	29.3 0.69	28.5 0.69	27.9 0.67	27.9 0.65	28.4 0.63	29.4 0.62	30.6 0.62	31.7 0.63	32.9 0.64	33.7 0.66	34.1 0.68
18	RA DEC	05 24 112	59.6 0.79	59.5 0.78	59.1 0.77	58.5 0.77	58.1 0.78	58.1 0.79	58.4 0.80	59.1 0.82	59.9 0.83	60.8 0.83	61.5 0.83	62.2 0.81	62.5 0.80
19	RA DEC	05 26 508	7.8 0.50	7.6 0.50	7.2 0.50	6.6 0.50	6.1 0.50	6.1 0.49	6.5 0.48	7.2 0.48	8.2 0.49	9.1 0.49	10.1 0.50	10.8 0.50	11.1 0.51
20	RA DEC	05 36 - 21	5.1 0.46	5.0 0.47	4.6 0.48	4.0 0.48	3.6 0.47	3.5 0.46	3.8 0.44	4.4 0.41	5.2 0.40	6.0 0.39	6.8 0.40	7.5 0.42	7.8 0.44
21	RA DEC	05 40 - 34	37.8 0.62	37.7 0.64	37.3 0.65	36.8 0.65	36.3 0.64	36.2 0.62	36.5 0.60	37.1 0.58	37.9 0.56	38.7 0.56	39.5 0.57	40.2 0.59	40.5 0.61
22	RA DEC	05 55 131	2.0 0.62	2.0 0.61	1.6 0.60	1.0 0.60	0.6 0.61	0.5 0.62	0.7 0.63	1.3 0.64	2.1 0.66	3.0 0.66	3.8 0.65	4.5 0.64	4.9 0.62
23	RA DEC	06 23 - 936	55.5 0.84	55.2 0.89	54.4 0.92	53.3 0.92	52.3 0.91	51.7 0.87	51.6 0.83	52.1 0.78	53.1 0.74	54.2 0.73	55.4 0.75	56.3 0.80	56.7 0.85
24	RA DEC	06 37 291	33.8 0.54	33.9 0.53	33.6 0.53	33.1 0.54	32.6 0.54	32.3 0.54	32.5 0.54	33.0 0.55	33.8 0.55	34.6 0.55	35.5 0.55	36.3 0.53	36.9 0.53
25	RA DEC	06 45 - 297	2.5 0.16	2.5 0.19	2.2 0.20	1.6 0.21	1.0 0.20	0.7 0.18	0.8 0.15	1.2 0.12	1.9 0.10	2.7 0.09	3.6 0.11	4.4 0.14	4.8 0.18

Table 10b(5). Apparent places of stars, 1997 (mils of declination) - continued

Star No.	Right Ascension (Hr Min) Declination (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH											
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
			Seconds (time of RA or arc of declination)											
26	RA 06 58	32.2	32.2	31.8	31.2	30.6	30.1	30.1	30.5	31.2	32.0	32.9	33.8	34.3
	DEC - 514	1.03	1.08	1.10	1.11	1.10	1.08	1.04	1.00	0.97	0.96	0.98	1.01	1.06
27	RA 07 08	17.9	17.9	17.6	16.9	16.3	15.9	15.9	16.2	16.9	17.7	18.6	19.5	20.0
	DEC - 469	0.18	0.21	0.24	0.25	0.24	0.22	0.19	0.15	0.12	0.11	0.12	0.16	0.20
28	RA 07 34	26.1	26.3	26.1	25.6	25.0	24.6	24.6	25.0	25.7	26.6	27.6	28.6	29.5
	DEC 566	0.96	0.97	0.98	0.99	1.00	0.99	0.98	0.97	0.96	0.95	0.93	0.93	0.93
29	RA 07 39	10.1	10.3	10.2	9.7	9.2	8.8	8.8	9.1	9.7	10.5	11.3	12.2	12.9
	DEC 92	0.97	0.96	0.95	0.95	0.95	0.96	0.97	0.98	0.99	0.99	0.98	0.96	0.93
30	RA 07 45	9.4	9.7	9.5	9.0	8.5	8.1	8.0	8.4	9.0	9.9	10.9	11.8	12.7
	DEC 498	0.31	0.32	0.33	0.34	0.34	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27
31	RA 08 09	28.7	29.0	28.6	27.9	27.0	26.2	25.8	25.9	26.4	27.3	28.4	29.5	30.4
	DEC - 841	0.40	0.45	0.50	0.52	0.53	0.51	0.47	0.43	0.39	0.36	0.36	0.40	0.45
32	RA 08 22	30.3	30.5	30.1	29.0	27.8	26.7	26.0	25.9	26.4	27.4	28.9	30.3	31.4
	DEC - 1057	0.78	0.84	0.89	0.92	0.93	0.91	0.88	0.83	0.78	0.76	0.75	0.78	0.83
33	RA 09 07	55.2	55.7	55.6	55.1	54.4	53.6	53.2	53.0	53.3	54.0	55.0	56.1	57.1
	DEC - 771	0.92	0.97	1.01	1.04	1.06	1.05	1.02	0.99	0.94	0.92	0.91	0.94	0.98
34	RA 09 13	14.5	15.2	14.8	13.6	11.8	10.0	8.7	8.0	8.2	9.3	11.3	13.4	15.0
	DEC - 1239	0.18	0.23	0.28	0.33	0.35	0.34	0.32	0.28	0.23	0.19	0.18	0.20	0.24
35	RA 09 27	27.6	28.1	28.2	28.0	27.5	27.1	26.9	26.8	27.1	27.6	28.4	29.3	30.2
	DEC - 153	0.73	0.76	0.78	0.79	0.79	0.78	0.77	0.75	0.73	0.73	0.74	0.76	0.80
36	RA 10 08	13.6	14.3	14.5	14.4	14.0	13.6	13.3	13.2	13.3	13.8	14.5	15.4	16.4
	DEC 212	0.96	0.95	0.94	0.94	0.95	0.96	0.97	0.97	0.97	0.96	0.94	0.91	0.88
37	RA 11 01	39.9	41.2	41.8	41.7	41.1	40.3	39.5	39.0	38.9	39.2	40.1	41.5	43.1
	DEC 1002	0.54	0.55	0.58	0.62	0.65	0.67	0.66	0.64	0.60	0.56	0.51	0.47	0.46
38	RA 11 03	32.8	34.3	34.9	34.9	34.1	33.1	32.1	31.4	31.3	31.7	32.7	34.2	36.1
	DEC 1097	0.98	1.00	1.02	1.06	1.10	1.12	1.11	1.08	1.04	1.00	0.95	0.91	0.90
39	RA 11 48	54.6	55.5	56.0	56.2	56.1	55.7	55.4	55.1	54.9	55.0	55.5	56.3	57.3
	DEC 259	0.32	0.30	0.29	0.30	0.31	0.33	0.34	0.34	0.34	0.32	0.29	0.26	0.23
40	RA 11 53	40.1	41.4	42.2	42.4	42.1	41.4	40.6	40.0	39.6	39.7	40.3	41.4	42.9
	DEC 954	0.78	0.78	0.80	0.84	0.87	0.90	0.90	0.89	0.85	0.81	0.76	0.72	0.69
41	RA 12 15	39.5	40.5	41.0	41.3	41.2	41.0	40.6	40.3	40.0	40.0	40.4	41.2	42.3
	DEC - 311	0.54	0.57	0.60	0.62	0.63	0.63	0.62	0.61	0.60	0.59	0.58	0.60	0.62
42	RA 12 26	27.3	29.0	30.0	30.4	30.2	29.5	28.5	27.4	26.6	26.3	27.0	28.4	30.2
	DEC - 1121	0.37	0.41	0.46	0.51	0.55	0.58	0.59	0.58	0.55	0.51	0.47	0.45	0.46
43	RA 12 31	1.0	2.5	3.4	3.8	3.7	3.2	2.4	1.5	0.8	0.7	1.2	2.4	4.0
	DEC - 1014	0.96	1.00	1.04	1.09	1.13	1.16	1.17	1.16	1.12	1.09	1.05	1.04	1.05
44	RA 12 47	33.7	35.3	36.3	36.9	36.9	36.3	35.5	34.6	33.7	33.4	33.9	35.1	36.8
	DEC - 1060	0.75	0.78	0.82	0.87	0.92	0.95	0.96	0.95	0.92	0.88	0.84	0.83	0.83
45	RA 12 53	52.8	54.3	55.3	55.9	55.8	55.2	54.4	53.5	52.9	52.6	52.8	53.8	55.2
	DEC 994	1.05	1.04	1.06	1.09	1.14	1.17	1.19	1.18	1.15	1.10	1.05	1.00	0.96
46	RA 13 23	47.1	48.5	49.6	50.2	50.3	49.8	49.1	48.2	47.5	47.0	47.1	47.9	49.2
	DEC 976	0.66	0.64	0.65	0.69	0.73	0.77	0.79	0.79	0.76	0.72	0.67	0.62	0.57
47	RA 13 25	2.0	3.0	3.7	4.2	4.3	4.2	4.0	3.6	3.2	3.1	3.2	3.8	4.8
	DEC - 198	0.12	0.15	0.17	0.19	0.19	0.19	0.18	0.17	0.16	0.16	0.16	0.17	0.20
48	RA 13 47	24.1	25.4	26.5	27.1	27.3	27.0	26.4	25.7	25.0	24.5	24.5	25.1	26.2
	DEC 876	0.88	0.86	0.87	0.90	0.94	0.98	1.00	1.01	0.99	0.95	0.90	0.85	0.80
49	RA 14 03	36.7	38.4	39.8	40.8	41.3	41.2	40.6	39.6	38.6	37.9	38.0	38.8	40.4
	DEC - 1072	0.94	0.96	0.99	1.03	1.08	1.11	1.14	1.14	1.12	1.09	1.05	1.02	1.02
50	RA 14 06	30.2	31.3	32.2	33.0	33.3	33.3	33.0	32.5	32.0	31.6	31.6	32.2	33.3
	DEC - 646	0.24	0.27	0.30	0.33	0.36	0.38	0.38	0.38	0.37	0.34	0.32	0.31	0.32

Table 10b(5). Apparent places of stars, 1997 (mils of declination) - continued

Star No.	Right Ascen- sion (Hr Min) Declina- tion (Mils)		ZERO HOURS UNIVERSAL TIME (GMT) OF FIRST DAY OF MONTH												
			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
			Seconds (time of RA or arc of declination)												
51	RA DEC	14 15 341	30.8 0.28	31.7 0.25	32.5 0.24	33.2 0.25	33.4 0.27	33.4 0.30	33.1 0.32	32.7 0.33	32.3 0.32	31.9 0.31	31.9 0.28	32.3 0.24	33.2 0.20
52	RA DEC	14 39 - 1081	23.2 0.20	25.0 0.20	26.4 0.23	27.6 0.27	28.2 0.31	28.2 0.35	27.7 0.37	26.7 0.38	25.6 0.37	24.8 0.34	24.6 0.30	25.3 0.27	26.8 0.26
53	RA DEC	14 50 - 284	42.2 0.92	43.2 0.94	44.0 0.96	44.7 0.98	45.2 0.99	45.3 0.99	45.2 0.99	44.9 0.98	44.4 0.97	44.0 0.96	43.9 0.96	44.3 0.97	45.1 0.99
54	RA DEC	14 50 1318	38.3 0.48	40.8 0.46	43.2 0.46	45.1 0.49	45.8 0.54	45.3 0.59	43.7 0.62	41.5 0.63	39.2 0.61	37.3 0.58	36.3 0.52	36.6 0.47	38.2 0.42
55	RA DEC	15 34 475	32.5 0.10	33.4 0.07	34.3 0.06	35.1 0.06	35.6 0.09	35.8 0.13	35.7 0.16	35.3 0.18	34.7 0.18	34.2 0.17	33.9 0.14	34.0 0.10	34.7 0.05
56	RA DEC	16 00 - 401	8.4 0.96	9.4 0.97	10.3 0.99	11.2 1.00	11.8 1.00	12.2 1.01	12.3 1.01	12.0 1.01	11.5 1.01	11.0 1.00	10.7 1.00	10.9 1.00	11.6 1.00
57	RA DEC	16 29 - 469	12.3 0.73	13.2 0.73	14.2 0.74	15.1 0.76	15.9 0.77	16.3 0.77	16.5 0.78	16.3 0.78	15.8 0.78	15.2 0.77	14.8 0.76	14.9 0.76	15.6 0.76
58	RA DEC	16 48 - 1226	18.0 0.98	19.9 0.96	22.0 0.96	24.3 0.97	26.2 1.00	27.3 1.04	27.5 1.08	26.9 1.11	25.4 1.12	23.8 1.11	22.6 1.08	22.5 1.05	23.6 1.01
59	RA DEC	17 10 - 279	11.2 0.44	11.9 0.45	12.8 0.46	13.7 0.47	14.5 0.47	15.0 0.46	15.3 0.46	15.2 0.45	14.8 0.45	14.2 0.45	13.8 0.45	13.7 0.45	14.2 0.46
60	RA DEC	17 33 - 659	22.8 0.53	23.7 0.52	24.6 0.52	25.8 0.53	26.7 0.54	27.5 0.55	27.9 0.56	27.8 0.57	27.3 0.58	26.6 0.58	26.1 0.57	26.0 0.56	26.4 0.54
61	RA DEC	17 34 223	46.4 0.36	47.1 0.33	47.8 0.31	48.7 0.31	49.5 0.32	50.1 0.35	50.3 0.38	50.2 0.40	49.8 0.42	49.2 0.42	48.7 0.41	48.6 0.38	48.9 0.35
62	RA DEC	17 56 915	30.0 0.39	30.7 0.34	31.7 0.31	32.9 0.31	34.0 0.33	34.7 0.38	34.9 0.43	34.6 0.47	33.8 0.50	32.7 0.50	31.7 0.48	31.2 0.44	31.3 0.39
63	RA DEC	18 23 - 611	56.8 0.26	57.5 0.25	58.3 0.25	59.4 0.24	60.4 0.24	61.3 0.25	61.8 0.25	61.9 0.27	61.6 0.28	60.9 0.28	60.3 0.28	60.0 0.27	60.3 0.26
64	RA DEC	18 36 689	48.6 0.48	49.1 0.43	49.8 0.40	50.8 0.39	51.8 0.41	52.6 0.45	53.0 0.50	52.9 0.54	52.4 0.57	51.6 0.58	50.9 0.57	50.4 0.54	50.4 0.49
65	RA DEC	18 55 - 467	3.3 0.53	3.8 0.53	4.5 0.52	5.5 0.52	6.5 0.51	7.3 0.50	7.9 0.50	8.1 0.50	7.9 0.51	7.3 0.52	6.7 0.52	6.4 0.52	6.6 0.51
66	RA DEC	19 50 157	37.0 0.56	37.3 0.53	37.8 0.52	38.6 0.51	39.5 0.53	40.3 0.55	40.9 0.58	41.2 0.61	41.1 0.63	40.6 0.64	40.0 0.63	39.7 0.62	39.6 0.60
67	RA DEC	20 25 - 1008	22.0 0.80	22.3 0.77	23.0 0.73	24.3 0.70	25.8 0.68	27.3 0.68	28.5 0.69	29.1 0.72	29.1 0.75	28.4 0.78	27.3 0.79	26.5 0.78	26.2 0.75
68	RA DEC	20 41 804	18.6 0.86	18.5 0.81	18.9 0.78	19.8 0.76	20.8 0.76	21.9 0.78	22.8 0.82	23.2 0.87	23.0 0.92	22.4 0.95	21.6 0.96	20.8 0.95	20.4 0.92
69	RA DEC	21 41 - 1375	2.4 1.11	1.7 1.06	2.3 1.01	4.4 0.97	7.4 0.93	10.8 0.92	13.9 0.93	16.1 0.96	16.6 1.00	15.5 1.04	13.0 1.06	10.3 1.06	8.3 1.04
70	RA DEC	21 44 175	1.5 0.34	1.5 0.32	1.7 0.31	2.2 0.30	3.0 0.31	3.9 0.34	4.7 0.37	5.3 0.40	5.5 0.42	5.3 0.44	4.9 0.44	4.4 0.43	4.1 0.42
71	RA DEC	22 08 - 834	1.0 1.16	0.8 1.14	1.0 1.11	1.6 1.07	2.6 1.03	3.8 1.01	5.0 1.00	6.0 1.01	6.4 1.03	6.2 1.06	5.5 1.09	4.8 1.10	4.3 1.09
72	RA DEC	22 57 - 526	28.2 0.94	27.9 0.93	27.9 0.91	28.3 0.88	29.0 0.85	29.9 0.81	30.9 0.80	31.8 0.79	32.3 0.80	32.3 0.81	32.0 0.83	31.5 0.85	31.1 0.85
73	RA DEC	23 04 270	36.4 0.06	36.1 0.04	36.1 0.02	36.3 0.01	37.0 0.01	37.8 0.03	38.8 0.06	39.6 0.10	40.0 0.13	40.0 0.15	39.8 0.16	39.4 0.16	39.0 0.14

Table 11a. Apparent places of Polaris (star No. 10), 1993

	DECLINATION				RIGHT ASCENSION		
	DEG	MIN	SEC	MILS	HR	MIN	SEC
JAN 0	89	14	22	1586.48	02	25	33
JAN 10	89	14	23	1586.49	02	25	20
JAN 20	89	14	24	1586.49	02	25	06
JAN 30	89	14	25	1586.49	02	24	49
FEB 0	89	14	25	1586.49	02	24	47
FEB 10	89	14	25	1586.49	02	24	32
FEB 20	89	14	24	1586.49	02	24	17
FEB 30	89	14	22	1586.48	02	24	03
MAR 0	89	14	23	1586.48	02	24	05
MAR 10	89	14	21	1586.47	02	23	52
MAR 20	89	14	18	1586.46	02	23	42
MAR 30	89	14	15	1586.45	02	23	35
APR 0	89	14	15	1586.45	02	23	34
APR 10	89	14	12	1586.43	02	23	29
APR 20	89	14	09	1586.41	02	23	27
APR 30	89	14	06	1586.40	02	23	29
MAY 0	89	14	06	1586.40	02	23	29
MAY 10	89	14	03	1586.38	02	23	34
MAY 20	89	14	00	1586.37	02	23	41
MAY 30	89	13	58	1586.36	02	23	50
JUN 0	89	13	57	1586.36	02	23	51
JUN 10	89	13	55	1586.35	02	24	04
JUN 20	89	13	54	1586.34	02	24	19
JUN 30	89	13	52	1586.33	02	24	34
JUL 0	89	13	52	1586.33	02	24	34
JUL 10	89	13	52	1586.33	02	24	50
JUL 20	89	13	52	1586.33	02	25	08
JUL 30	89	13	52	1586.33	02	25	25
AUG 0	89	13	52	1586.33	02	25	27
AUG 10	89	13	53	1586.34	02	25	44
AUG 20	89	13	55	1586.34	02	26	00
AUG 30	89	13	57	1586.35	02	26	17
SEP 0	89	13	57	1586.36	02	26	18
SEP 10	89	13	59	1586.37	02	26	33
SEP 20	89	14	02	1586.38	02	26	46
SEP 30	89	14	05	1586.40	02	26	57
OCT 0	89	14	05	1586.40	02	26	57
OCT 10	89	14	09	1586.41	02	27	07
OCT 20	89	14	12	1586.43	02	27	15
OCT 30	89	14	16	1586.45	02	27	18
NOV 0	89	14	16	1586.45	02	27	19
NOV 10	89	14	20	1586.47	02	27	21
NOV 20	89	14	23	1586.49	02	27	20
NOV 30	89	14	27	1586.50	02	27	16
DEC 0	89	14	27	1586.50	02	27	16
DEC 10	89	14	30	1586.52	02	27	09
DEC 20	89	14	33	1586.53	02	27	00
DEC 30	89	14	35	1586.54	02	26	49

Table 11b. Apparent places of Polaris (star No. 10), 1994

	DECLINATION				RIGHT ASCENSION		
	DEG	MIN	SEC	MILS	HR	MIN	SEC
JAN 0	89	14	35	1586.54	02	26	47
JAN 10	89	14	37	1586.55	02	26	34
JAN 20	89	14	38	1586.56	02	26	18
JAN 30	89	14	39	1586.56	02	26	02
FEB 0	89	14	39	1586.56	02	26	00
FEB 10	89	14	39	1586.56	02	25	45
FEB 20	89	14	38	1586.56	02	25	29
FEB 30	89	14	36	1586.55	02	25	15
MAR 0	89	14	36	1586.55	02	25	17
MAR 10	89	14	35	1586.54	02	25	05
MAR 20	89	14	32	1586.53	02	24	54
MAR 30	89	14	29	1586.51	02	24	46
APR 0	89	14	29	1586.51	02	24	45
APR 10	89	14	26	1586.50	02	24	40
APR 20	89	14	23	1586.48	02	24	39
APR 30	89	14	20	1586.47	02	24	40
MAY 0	89	14	20	1586.47	02	24	40
MAY 10	89	14	17	1586.45	02	24	44
MAY 20	89	14	14	1586.44	02	24	51
MAY 30	89	14	11	1586.43	02	25	01
JUN 0	89	14	11	1586.43	02	25	02
JUN 10	89	14	09	1586.41	02	25	14
JUN 20	89	14	07	1586.41	02	25	28
JUN 30	89	14	06	1586.40	02	25	43
JUL 0	89	14	06	1586.40	02	25	43
JUL 10	89	14	05	1586.40	02	26	00
JUL 20	89	14	05	1586.40	02	26	17
JUL 30	89	14	06	1586.40	02	26	34
AUG 0	89	14	06	1586.40	02	26	36
AUG 10	89	14	07	1586.40	02	26	53
AUG 20	89	14	08	1586.41	02	27	11
AUG 30	89	14	10	1586.42	02	27	26
SEP 0	89	14	10	1586.42	02	27	28
SEP 10	89	14	13	1586.43	02	27	42
SEP 20	89	14	16	1586.45	02	27	56
SEP 30	89	14	19	1586.46	02	28	08
OCT 0	89	14	19	1586.46	02	28	08
OCT 10	89	14	22	1586.48	02	28	17
OCT 20	89	14	25	1586.50	02	28	24
OCT 30	89	14	29	1586.51	02	28	29
NOV 0	89	14	29	1586.52	02	28	29
NOV 10	89	14	33	1586.53	02	28	31
NOV 20	89	14	37	1586.55	02	28	30
NOV 30	89	14	40	1586.57	02	28	26
DEC 0	89	14	40	1586.57	02	28	26
DEC 10	89	14	43	1586.58	02	28	19
DEC 20	89	14	46	1586.60	02	28	10
DEC 30	89	14	48	1586.61	02	27	59

Table 11c. Apparent places of Polaris (star No. 10), 1995

	DECLINATION				RIGHT ASCENSION		
	DEG	MIN	SEC	MILS	HR	MIN	SEC
JAN 0	89	14	49	1586.61	02	27	57
JAN 10	89	14	50	1586.62	02	27	43
JAN 20	89	14	52	1586.63	02	27	28
JAN 30	89	14	52	1586.63	02	27	12
FEB 0	89	14	52	1586.63	02	27	11
FEB 10	89	14	52	1586.63	02	26	54
FEB 20	89	14	51	1586.62	02	26	38
FEB 30	89	14	50	1586.62	02	26	23
MAR 0	89	14	50	1586.62	02	26	27
MAR 10	89	14	48	1586.61	02	26	13
MAR 20	89	14	46	1586.60	02	26	02
MAR 30	89	14	43	1586.58	02	25	53
APR 0	89	14	43	1586.58	02	25	53
APR 10	89	14	40	1586.57	02	25	48
APR 20	89	14	36	1586.55	02	25	46
APR 30	89	14	33	1586.53	02	25	47
MAY 0	89	14	33	1586.53	02	25	47
MAY 10	89	14	30	1586.52	02	25	50
MAY 20	89	14	27	1586.51	02	25	58
MAY 30	89	14	25	1586.49	02	26	07
JUN 0	89	14	25	1586.49	02	26	08
JUN 10	89	14	22	1586.48	02	26	20
JUN 20	89	14	21	1586.47	02	26	34
JUN 30	89	14	20	1586.47	02	26	50
JUL 0	89	14	20	1586.47	02	26	50
JUL 10	89	14	19	1586.46	02	27	06
JUL 20	89	14	19	1586.46	02	27	22
JUL 30	89	14	19	1586.46	02	27	40
AUG 0	89	14	19	1586.47	02	27	42
AUG 10	89	14	20	1586.47	02	27	59
AUG 20	89	14	21	1586.48	02	28	16
AUG 30	89	14	23	1586.49	02	28	31
SEP 0	89	14	24	1586.49	02	28	33
SEP 10	89	14	26	1586.50	02	28	48
SEP 20	89	14	29	1586.51	02	29	02
SEP 30	89	14	32	1586.53	02	29	13
OCT 0	89	14	32	1586.53	02	29	13
OCT 10	89	14	35	1586.54	02	29	22
OCT 20	89	14	39	1586.56	02	29	30
OCT 30	89	14	42	1586.58	02	29	35
NOV 0	89	14	43	1586.58	02	29	35
NOV 10	89	14	46	1586.60	02	29	37
NOV 20	89	14	50	1586.62	02	29	35
NOV 30	89	14	53	1586.63	02	29	32
DEC 0	89	14	53	1586.63	02	29	32
DEC 10	89	14	57	1586.65	02	29	26
DEC 20	89	14	59	1586.66	02	29	16
DEC 30	89	15	02	1586.68	02	29	04

Table 11d. Apparent places of Polaris (star No. 10), 1996

	DECLINATION				RIGHT ASCENSION		
	DEG	MIN	SEC	MILS	HR	MIN	SEC
JAN 0	89	15	02	1586.68	02	29	03
JAN 10	89	15	04	1586.69	02	28	49
JAN 20	89	15	05	1586.69	02	28	34
JAN 30	89	15	06	1586.69	02	28	17
FEB 0	89	15	06	1586.69	02	28	16
FEB 10	89	15	05	1586.69	02	27	58
FEB 20	89	15	05	1586.69	02	27	43
FEB 30	89	15	03	1586.68	02	27	28
MAR 0	89	15	03	1586.68	02	27	30
MAR 10	89	15	01	1586.67	02	27	16
MAR 20	89	14	59	1586.66	02	27	05
MAR 30	89	14	56	1586.65	02	26	57
APR 0	89	14	56	1586.65	02	26	56
APR 10	89	14	53	1586.63	02	26	51
APR 20	89	14	50	1586.62	02	26	48
APR 30	89	14	47	1586.60	02	26	49
MAY 0	89	14	47	1586.60	02	26	49
MAY 10	89	14	44	1586.59	02	26	54
MAY 20	89	14	41	1586.57	02	27	01
MAY 30	89	14	38	1586.56	02	27	10
JUN 0	89	14	38	1586.56	02	27	11
JUN 10	89	14	36	1586.55	02	27	23
JUN 20	89	14	34	1586.54	02	27	37
JUN 30	89	14	33	1586.53	02	27	52
JUL 0	89	14	33	1586.53	02	27	52
JUL 10	89	14	32	1586.53	02	28	08
JUL 20	89	14	32	1586.53	02	28	25
JUL 30	89	14	33	1586.53	02	28	43
AUG 0	89	14	33	1586.53	02	28	45
AUG 10	89	14	34	1586.54	02	29	02
AUG 20	89	14	35	1586.54	02	29	18
AUG 30	89	14	37	1586.55	02	29	34
SEP 0	89	14	37	1586.56	02	29	36
SEP 10	89	14	40	1586.57	02	29	51
SEP 20	89	14	42	1586.58	02	30	04
SEP 30	89	14	46	1586.60	02	30	15
OCT 0	89	14	46	1586.60	02	30	15
OCT 10	89	14	49	1586.61	02	30	24
OCT 20	89	14	52	1586.63	02	30	32
OCT 30	89	14	56	1586.65	02	30	36
NOV 0	89	14	56	1586.65	02	30	37
NOV 10	89	15	00	1586.67	02	30	38
NOV 20	89	15	04	1586.69	02	30	37
NOV 30	89	15	07	1586.70	02	30	33
DEC 0	89	15	07	1586.70	02	30	33
DEC 10	89	15	10	1586.72	02	30	26
DEC 20	89	15	13	1586.73	02	30	16
DEC 30	89	15	16	1586.74	02	30	04

Table 11e. Apparent places of Polaris (star No. 10), 1997

	DECLINATION				RIGHT ASCENSION		
	DEG	MIN	SEC	MILS	HR	MIN	SEC
JAN 0	89	15	16	1586.74	02	30	02
JAN 10	89	15	18	1586.75	02	29	49
JAN 20	89	15	19	1586.76	02	29	33
JAN 30	89	15	19	1586.76	02	29	16
FEB 0	89	15	19	1586.76	02	29	14
FEB 10	89	15	19	1586.76	02	28	57
FEB 20	89	15	18	1586.76	02	28	42
FEB 30	89	15	17	1586.75	02	28	26
MAR 0	89	15	17	1586.75	02	28	29
MAR 10	89	15	15	1586.74	02	28	15
MAR 20	89	15	13	1586.73	02	28	05
MAR 30	89	15	10	1586.72	02	27	56
APR 0	89	15	10	1586.72	02	27	55
APR 10	89	15	07	1586.70	02	27	49
APR 20	89	15	04	1586.69	02	27	47
APR 30	89	15	01	1586.67	02	27	48
MAY 0	89	15	01	1586.67	02	27	48
MAY 10	89	14	58	1586.65	02	27	52
MAY 20	89	14	55	1586.64	02	27	58
MAY 30	89	14	52	1586.63	02	28	07
JUN 0	89	14	52	1586.63	02	28	08
JUN 10	89	14	50	1586.62	02	28	21
JUN 20	89	14	48	1586.61	02	28	34
JUN 30	89	14	47	1586.60	02	28	49
JUL 0	89	14	47	1586.60	02	28	49
JUL 10	89	14	46	1586.60	02	29	05
JUL 20	89	14	46	1586.60	02	29	23
JUL 30	89	14	47	1586.60	02	29	40
AUG 0	89	14	47	1586.60	02	29	42
AUG 10	89	14	48	1586.61	02	29	59
AUG 20	89	14	49	1586.61	02	30	15
AUG 30	89	14	51	1586.62	02	30	32
SEP 0	89	14	51	1586.62	02	30	33
SEP 10	89	14	54	1586.64	02	30	48
SEP 20	89	14	56	1586.65	02	31	01
SEP 30	89	15	00	1586.66	02	31	12
OCT 0	89	15	00	1586.66	02	31	12
OCT 10	89	15	03	1586.68	02	31	22
OCT 20	89	15	06	1586.70	02	31	29
OCT 30	89	15	10	1586.72	02	31	33
NOV 0	89	15	10	1586.72	02	31	34
NOV 10	89	15	14	1586.74	02	31	35
NOV 20	89	15	18	1586.75	02	31	35
NOV 30	89	15	21	1586.77	02	31	30
DEC 0	89	15	21	1586.77	02	31	30
DEC 10	89	15	24	1586.79	02	31	23
DEC 20	89	15	27	1586.80	02	31	13
DEC 30	89	15	30	1586.81	02	31	02

Table 12a. To determine azimuth from Polaris, 1993

LST	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	6 ^h	7 ^h	8 ^h	9 ^h	10 ^h	11 ^h
	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀
Minutes												
0	+27.5	+16.9	+ 5.1	- 7.0	-18.6	-29.0	-37.2	-42.9	-45.6	-45.2	-41.7	-35.4
3	27.0	16.4	4.5	7.6	19.2	29.4	37.6	43.1	45.7	45.1	41.4	35.0
6	26.5	15.8	3.9	8.2	19.7	29.9	37.9	43.3	45.7	45.0	41.2	34.7
9	26.0	15.2	3.3	8.8	20.3	30.3	38.3	43.5	45.7	44.8	40.9	34.3
12	25.5	14.6	2.7	9.4	20.8	30.8	38.6	43.7	45.8	44.7	40.6	33.9
15	+25.0	+14.1	+ 2.1	-10.0	-21.4	-31.2	-38.9	-43.9	-45.8	-44.6	-40.4	-33.5
18	24.5	13.5	1.5	10.6	21.9	31.7	39.2	44.0	45.8	44.4	40.1	33.1
21	24.0	12.9	0.9	11.2	22.4	32.1	39.5	44.2	45.8	44.3	39.8	32.6
24	23.5	12.3	+ 0.3	11.8	23.0	32.5	39.8	44.4	45.8	44.1	39.5	32.2
27	22.9	11.7	- 0.3	12.3	23.5	33.0	40.1	44.5	45.8	44.0	39.2	31.8
30	+22.4	+11.1	- 0.9	-12.9	-24.0	-33.4	-40.4	-44.6	-45.8	-43.8	-38.9	-31.4
33	21.9	10.5	1.5	13.5	24.5	33.8	40.7	44.8	45.8	43.6	38.6	30.9
36	21.3	10.0	2.1	14.1	25.0	34.2	41.0	44.9	45.7	43.4	38.2	30.5
39	20.8	9.4	2.8	14.7	25.5	34.6	41.2	45.0	45.7	43.2	37.9	30.0
42	20.3	8.8	3.4	15.2	26.0	35.0	41.5	45.1	45.6	43.0	37.6	29.6
45	+19.7	+ 8.2	- 4.0	-15.8	-26.5	-35.4	-41.8	-45.2	-45.6	-42.8	-37.2	-29.1
48	19.2	7.6	4.6	16.4	27.0	35.8	42.0	45.3	45.5	42.6	36.9	28.7
51	18.6	7.0	5.2	17.0	27.5	36.1	42.2	45.4	45.4	42.4	36.5	28.2
54	18.0	6.4	5.8	17.5	28.0	36.5	42.5	45.5	45.4	42.2	36.2	27.8
57	17.5	5.8	6.4	18.1	28.5	36.9	42.7	45.5	45.3	41.9	35.8	27.3
60	+16.9	+ 5.1	- 7.0	-18.6	-29.0	-37.2	-42.9	-45.6	-45.2	-41.7	-35.4	-26.8
LATITUDE	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁
Degrees												
0	-.3	-.2	.0	+.2	+.3	+.4	+.3	+.2	.0	-.2	-.3	-.4
10	-.3	-.1	.0	+.2	+.3	+.3	+.3	+.1	.0	-.2	-.3	-.3
20	-.2	-.1	.0	+.1	+.2	+.3	+.2	+.1	.0	-.1	-.2	-.3
30	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
40	-.1	-.1	.0	+.1	+.1	+.1	+.1	+.1	.0	-.1	-.1	-.1
45	.0	.0	.0	.0	+.1	+.1	.0	.0	.0	.0	-.1	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+.1	.0	.0	.0	-.1	-.1	-.1	.0	.0	.0	+.1	+.1
60	+.1	+.1	.0	-.1	-.1	-.2	-.1	-.1	.0	+.1	+.1	+.2
62	+.2	+.1	.0	-.1	-.2	-.2	-.2	-.1	.0	+.1	+.2	+.2
64	+.2	+.1	.0	-.1	-.2	-.3	-.2	-.1	.0	+.1	+.2	+.3
66	+.3	+.1	.0	-.2	-.3	-.3	-.3	-.1	.0	+.2	+.3	+.3
MONTH	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂
JAN	-.1	-.1	.0	.0	+.1	+.1	+.1	+.2	+.2	+.2	+.2	+.2
FEB	-.3	-.2	-.2	-.1	-.1	.0	+.1	+.1	+.2	+.2	+.3	+.3
MAR	-.3	-.3	-.3	-.3	-.2	-.1	-.1	.0	+.1	+.2	+.3	+.3
APR	-.3	-.4	-.4	-.4	-.3	-.3	-.2	-.1	.0	+.1	+.2	+.2
MAY	-.2	-.3	-.3	-.4	-.4	-.4	-.3	-.3	-.2	-.1	.0	+.1
JUN	-.1	-.2	-.2	-.3	-.3	-.4	-.4	-.3	-.3	-.2	-.1	.0
JUL	+.1	.0	-.1	-.2	-.2	-.3	-.3	-.3	-.3	-.3	-.2	-.2
AUG	+.2	+.2	+.1	.0	-.1	-.1	-.2	-.3	-.3	-.3	-.3	-.3
SEP	+.3	+.3	+.2	+.2	+.1	.0	.0	-.1	-.2	-.2	-.3	-.3
OCT	+.3	+.3	+.3	+.3	+.3	+.2	+.2	+.1	.0	-.1	-.2	-.3
NOV	+.3	+.3	+.4	+.4	+.4	+.4	+.3	+.2	+.2	.0	-.1	-.2
DEC	+.1	+.2	+.3	+.4	+.4	+.5	+.4	+.4	+.3	+.2	+.1	.0

$$\text{Azimuth of Polaris} = (b_0 + b_1 + b_2)$$

COS (Latitude)

Table 12a. To determine azimuth from Polaris, 1993 - continued

LST	12 ^h	13 ^h	14 ^h	15 ^h	16 ^h	17 ^h	18 ^h	19 ^h	20 ^h	21 ^h	22 ^h	23 ^h
	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀
Minutes												
0	-26.8	-16.4	- 5.0	+ 6.8	+18.1	+28.2	+36.5	+42.4	+45.4	+45.4	+42.2	+36.1
3	26.3	15.9	4.4	7.4	18.6	28.7	36.9	42.6	45.5	45.3	42.0	35.8
6	25.8	15.3	3.8	7.9	19.2	29.2	37.2	42.8	45.6	45.2	41.7	35.4
9	25.3	14.8	3.2	8.5	19.7	29.6	37.6	43.1	45.6	45.1	41.5	35.0
12	24.8	14.2	2.6	9.1	20.2	30.1	37.9	43.3	45.7	45.0	41.2	34.6
15	-24.3	-13.6	- 2.0	+ 9.7	+20.8	+30.5	+38.3	+43.4	+45.7	+44.9	+41.0	+34.2
18	23.8	13.1	1.5	10.3	21.3	31.0	38.6	43.6	45.8	44.8	40.7	33.8
21	23.3	12.5	0.9	10.8	21.8	31.4	38.9	43.8	45.8	44.6	40.4	33.4
24	22.8	11.9	- 0.3	11.4	22.3	31.8	39.2	44.0	45.8	44.5	40.1	32.9
27	22.3	11.4	+ 0.3	12.0	22.9	32.2	39.5	44.1	45.8	44.3	39.8	32.5
30	-21.8	-10.8	+ 0.9	+12.5	+23.4	+32.7	+39.8	+44.3	+45.8	+44.2	+39.5	+32.1
33	21.3	10.2	1.5	13.1	23.9	33.1	40.1	44.4	45.8	44.0	39.2	31.7
36	20.7	9.6	2.1	13.7	24.4	33.5	40.4	44.6	45.8	43.9	38.9	31.2
39	20.2	9.1	2.7	14.2	24.9	33.9	40.7	44.7	45.8	43.7	38.6	30.8
42	19.7	8.5	3.3	14.8	25.4	34.3	40.9	44.8	45.7	43.5	38.2	30.3
45	-19.2	- 7.9	+ 3.8	+15.4	+25.9	+34.7	+41.2	+45.0	+45.7	+43.3	+37.9	+29.9
48	18.6	7.3	4.4	15.9	26.3	35.1	41.5	45.1	45.6	43.1	37.6	29.4
51	18.1	6.7	5.0	16.5	26.8	35.4	41.7	45.2	45.6	42.9	37.2	28.9
54	17.5	6.2	5.6	17.0	27.3	35.8	41.9	45.3	45.5	42.7	36.9	28.5
57	17.0	5.6	6.2	17.6	27.8	36.2	42.2	45.4	45.5	42.5	36.5	28.0
60	-16.4	- 5.0	+ 6.8	+18.1	+28.2	+36.5	+42.4	+45.4	+45.4	+42.2	+36.1	+27.5
LATITUDE	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁
Degrees												
0	-.3	-.2	.0	+ .2	+ .3	+ .4	+ .3	+ .2	.0	-.2	-.3	-.4
10	-.3	-.1	.0	+ .2	+ .3	+ .3	+ .3	+ .1	.0	-.2	-.3	-.3
20	-.2	-.1	.0	+ .1	+ .2	+ .3	+ .2	+ .1	.0	-.1	-.2	-.3
30	-.2	-.1	.0	+ .1	+ .2	+ .2	+ .2	+ .1	.0	-.1	-.2	-.2
40	-.1	-.1	.0	+ .1	+ .1	+ .1	+ .1	+ .1	.0	-.1	-.1	-.1
45	.0	.0	.0	.0	+ .1	+ .1	.0	.0	.0	.0	-.1	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+ .1	.0	.0	.0	-.1	-.1	-.1	.0	.0	.0	+ .1	+ .1
60	+ .1	+ .1	.0	-.1	-.1	-.2	-.1	-.1	.0	+ .1	+ .1	+ .2
62	+ .2	+ .1	.0	-.1	-.2	-.2	-.2	-.1	.0	+ .1	+ .2	+ .2
64	+ .2	+ .1	.0	-.1	-.2	-.3	-.2	-.1	.0	+ .1	+ .2	+ .3
66	+ .3	+ .1	.0	-.2	-.3	-.3	-.3	-.1	.0	+ .2	+ .3	+ .3
MONTH	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂
JAN	+ .1	+ .1	.0	.0	-.1	-.1	-.1	-.2	-.2	-.2	-.2	-.2
FEB	+ .3	+ .2	+ .2	+ .1	+ .1	.0	-.1	-.1	-.2	-.2	-.3	-.3
MAR	+ .3	+ .3	+ .3	+ .3	+ .2	+ .1	+ .1	.0	-.1	-.2	-.3	-.3
APR	+ .3	+ .4	+ .4	+ .4	+ .3	+ .3	+ .2	+ .1	.0	-.1	-.2	-.2
MAY	+ .2	+ .3	+ .3	+ .4	+ .4	+ .4	+ .3	+ .3	+ .2	+ .1	.0	-.1
JUN	+ .1	+ .2	+ .2	+ .3	+ .3	+ .4	+ .4	+ .3	+ .3	+ .2	+ .1	.0
JUL	-.1	.0	+ .1	+ .2	+ .2	+ .3	+ .3	+ .3	+ .3	+ .3	+ .2	+ .2
AUG	-.2	-.2	-.1	.0	+ .1	+ .1	+ .2	+ .3	+ .3	+ .3	+ .3	+ .3
SEP	-.3	-.3	-.2	-.2	-.1	.0	.0	+ .1	+ .2	+ .2	+ .3	+ .3
OCT	-.3	-.3	-.3	-.3	-.3	-.2	-.2	-.1	.0	+ .1	+ .2	+ .3
NOV	-.3	-.3	-.4	-.4	-.4	-.4	-.3	-.2	-.2	.0	+ .1	+ .2
DEC	-.1	-.2	-.3	-.4	-.4	-.5	-.4	-.4	-.3	-.2	-.1	.0

$$\text{Azimuth of Polaris} = \frac{(b_0 + b_1 + b_2)}{\cos(\text{Latitude})}$$

Table 12b. To determine azimuth from Polaris, 1994

LST	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	6 ^h	7 ^h	8 ^h	9 ^h	10 ^h	11 ^h
	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀
Minutes												
0	+27.6	+17.1	+ 5.4	- 6.7	-18.3	-28.6	-36.9	-42.6	-45.4	-45.0	-41.6	-35.4
3	27.1	16.5	4.8	7.3	18.9	29.1	37.3	42.8	45.4	44.9	41.4	35.0
6	26.6	15.9	4.2	7.9	19.4	29.6	37.6	43.0	45.5	44.8	41.1	34.7
9	26.1	15.4	3.6	8.5	20.0	30.0	38.0	43.2	45.5	44.7	40.8	34.3
12	25.6	14.8	2.9	9.1	20.5	30.5	38.3	43.4	45.6	44.6	40.6	33.9
15	+25.1	+14.2	+ 2.3	- 9.7	-21.1	-30.9	-38.6	-43.6	-45.6	-44.4	-40.3	-33.5
18	24.6	13.6	1.7	10.3	21.6	31.4	38.9	43.8	45.6	44.3	40.0	33.1
21	24.1	13.1	1.1	10.9	22.1	31.8	39.2	43.9	45.6	44.2	39.7	32.7
24	23.6	12.5	+ 0.5	11.5	22.7	32.2	39.5	44.1	45.6	44.0	39.4	32.2
27	23.0	11.9	- 0.1	12.1	23.2	32.7	39.8	44.2	45.6	43.8	39.1	31.8
30	+22.5	+11.3	- 0.7	-12.6	-23.7	-33.1	-40.1	-44.4	-45.6	-43.7	-38.8	-31.4
33	22.0	10.7	1.3	13.2	24.2	33.5	40.4	44.5	45.6	43.5	38.5	31.0
36	21.5	10.1	1.9	13.8	24.7	33.9	40.7	44.6	45.5	43.3	38.2	30.5
39	20.9	9.5	2.5	14.4	25.2	34.3	41.0	44.8	45.5	43.1	37.9	30.1
42	20.4	9.0	3.1	15.0	25.7	34.7	41.2	44.9	45.4	42.9	37.5	29.6
45	+19.8	+ 8.4	- 3.7	-15.5	-26.2	-35.1	-41.5	-45.0	-45.4	-42.7	-37.2	-29.2
48	19.3	7.8	4.3	16.1	26.7	35.5	41.7	45.1	45.3	42.5	36.9	28.7
51	18.7	7.2	4.9	16.7	27.2	35.8	42.0	45.2	45.3	42.3	36.5	28.3
54	18.2	6.6	5.5	17.2	27.7	36.2	42.2	45.2	45.2	42.1	36.1	27.8
57	17.6	6.0	6.1	17.8	28.2	36.6	42.4	45.3	45.1	41.8	35.8	27.3
60	+17.1	+ 5.4	- 6.7	-18.3	-28.6	-36.9	-42.6	-45.4	-45.0	-41.6	-35.4	-26.9
LATITUDE	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁
Degrees												
0	-.3	-.2	.0	+.2	+.3	+.4	+.3	+.2	.0	-.2	-.3	-.4
10	-.3	-.1	.0	+.2	+.3	+.3	+.3	+.1	.0	-.2	-.3	-.3
20	-.2	-.1	.0	+.1	+.2	+.3	+.2	+.1	.0	-.1	-.2	-.3
30	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
40	-.1	-.1	.0	+.1	+.1	+.1	+.1	+.1	.0	-.1	-.1	-.1
45	.0	.0	.0	.0	+.1	+.1	.0	.0	.0	.0	-.1	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+.1	.0	.0	.0	-.1	-.1	-.1	.0	.0	.0	+.1	+.1
60	+.1	+.1	.0	-.1	-.1	-.2	-.1	-.1	.0	+.1	+.1	+.2
62	+.2	+.1	.0	-.1	-.2	-.2	-.2	-.1	.0	+.1	+.2	+.2
64	+.2	+.1	.0	-.1	-.2	-.3	-.2	-.1	.0	+.1	+.2	+.3
66	+.3	+.2	.0	-.2	-.3	-.3	-.3	-.2	.0	+.2	+.3	+.3
MONTH	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂
JAN	-.1	-.1	.0	.0	+.1	+.1	+.2	+.2	+.2	+.2	+.2	+.2
FEB	-.3	-.2	-.2	-.1	.0	.0	+.1	+.2	+.2	+.3	+.3	+.3
MAR	-.3	-.3	-.3	-.3	-.2	-.1	.0	+.1	+.1	+.2	+.3	+.3
APR	-.3	-.4	-.4	-.4	-.3	-.3	-.2	-.1	.0	+.1	+.2	+.3
MAY	-.2	-.3	-.3	-.4	-.4	-.3	-.3	-.2	-.1	.0	.0	+.1
JUN	-.1	-.2	-.2	-.3	-.3	-.4	-.3	-.3	-.3	-.2	-.1	.0
JUL	+.1	.0	-.1	-.2	-.2	-.3	-.3	-.3	-.3	-.3	-.2	-.2
AUG	+.2	+.2	+.1	.0	-.1	-.1	-.2	-.2	-.3	-.3	-.3	-.3
SEP	+.3	+.3	+.2	+.2	+.1	+.1	.0	-.1	-.2	-.2	-.3	-.3
OCT	+.3	+.3	+.3	+.3	+.3	+.2	+.2	+.1	.0	-.1	-.2	-.2
NOV	+.2	+.3	+.4	+.4	+.4	+.4	+.3	+.3	+.2	+.1	.0	-.1
DEC	+.1	+.2	+.3	+.4	+.4	+.5	+.5	+.4	+.3	+.2	+.1	.0

$$\text{Azimuth of Polaris} = \frac{(b_0 + b_1 + b_2)}{\cos(\text{Latitude})}$$

Table 12b. To determine azimuth from Polaris, 1994 - continued

LST	12 ^h	13 ^h	14 ^h	15 ^h	16 ^h	17 ^h	18 ^h	19 ^h	20 ^h	21 ^h	22 ^h	23 ^h
	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀
Minutes												
0	-26.9	-16.6	- 5.2	+ 6.5	+17.8	+27.9	+36.2	+42.1	+45.2	+45.2	+42.1	+36.1
3	26.4	16.0	4.6	7.1	18.4	28.4	36.6	42.4	45.3	45.1	41.9	35.7
6	25.9	15.5	4.0	7.7	18.9	28.9	36.9	42.6	45.4	45.0	41.7	35.4
9	25.4	14.9	3.4	8.3	19.4	29.3	37.3	42.8	45.4	45.0	41.4	35.0
12	24.9	14.4	2.9	8.8	20.0	29.8	37.6	43.0	45.5	44.8	41.1	34.6
15	-24.4	-13.8	- 2.3	+ 9.4	+20.5	+30.2	+38.0	+43.2	+45.5	+44.7	+40.9	+34.2
18	23.9	13.2	1.7	10.0	21.0	30.7	38.3	43.4	45.5	44.6	40.6	33.8
21	23.4	12.7	1.1	10.6	21.5	31.1	38.6	43.5	45.6	44.5	40.3	33.4
24	22.9	12.1	- 0.5	11.1	22.0	31.5	38.9	43.7	45.6	44.4	40.1	33.0
27	22.4	11.5	+ 0.1	11.7	22.6	31.9	39.2	43.9	45.6	44.2	39.8	32.5
30	-21.9	-11.0	+ 0.7	+12.3	+23.1	+32.4	+39.5	+44.0	+45.6	+44.1	+39.5	+32.1
33	21.4	10.4	1.3	12.8	23.6	32.8	39.8	44.2	45.6	43.9	39.2	31.7
36	20.9	9.8	1.8	13.4	24.1	33.2	40.1	44.3	45.6	43.7	38.8	31.3
39	20.3	9.3	2.4	14.0	24.6	33.6	40.4	44.5	45.6	43.6	38.5	30.8
42	19.8	8.7	3.0	14.5	25.1	34.0	40.6	44.6	45.5	43.4	38.2	30.4
45	-19.3	- 8.1	+ 3.6	+15.1	+25.6	+34.4	+40.9	+44.7	+45.5	+43.2	+37.9	+29.9
48	18.7	7.5	4.2	15.6	26.0	34.8	41.2	44.8	45.5	43.0	37.5	29.5
51	18.2	6.9	4.8	16.2	26.5	35.1	41.4	44.9	45.4	42.8	37.2	29.0
54	17.7	6.4	5.4	16.7	27.0	35.5	41.7	45.0	45.4	42.6	36.8	28.5
57	17.1	5.8	5.9	17.3	27.5	35.9	41.9	45.1	45.3	42.4	36.5	28.0
60	-16.6	- 5.2	+ 6.5	+17.8	+27.9	+36.2	+42.1	+45.2	+45.2	+42.1	+36.1	+27.6
LATITUDE	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁
Degrees												
0	-.3	-.2	.0	+.2	+.3	+.4	+.3	+.2	.0	-.2	-.3	-.4
10	-.3	-.1	.0	+.2	+.3	+.3	+.3	+.1	.0	-.2	-.3	-.3
20	-.2	-.1	.0	+.1	+.2	+.3	+.2	+.1	.0	-.1	-.2	-.3
30	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
40	-.1	-.1	.0	+.1	+.1	+.1	+.1	+.1	.0	-.1	-.1	-.1
45	.0	.0	.0	.0	+.1	+.1	.0	.0	.0	.0	-.1	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+.1	.0	.0	.0	-.1	-.1	-.1	.0	.0	.0	+.1	+.1
60	+.1	+.1	.0	-.1	-.1	-.2	-.1	-.1	.0	+.1	+.1	+.2
62	+.2	+.1	.0	-.1	-.2	-.2	-.2	-.1	.0	+.1	+.2	+.2
64	+.2	+.1	.0	-.1	-.2	-.3	-.2	-.1	.0	+.1	+.2	+.3
66	+.3	+.2	.0	-.2	-.3	-.3	-.3	-.2	.0	+.2	+.3	+.3
MONTH	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂
JAN	+.1	+.1	.0	.0	-.1	-.1	-.2	-.2	-.2	-.2	-.2	-.2
FEB	+.3	+.2	+.2	+.1	.0	.0	-.1	-.2	-.2	-.3	-.3	-.3
MAR	+.3	+.3	+.3	+.3	+.2	+.1	.0	-.1	-.1	-.2	-.3	-.3
APR	+.3	+.4	+.4	+.4	+.3	+.3	+.2	+.1	.0	-.1	-.2	-.3
MAY	+.2	+.3	+.3	+.4	+.4	+.3	+.3	+.2	+.1	.0	.0	-.1
JUN	+.1	+.2	+.2	+.3	+.3	+.4	+.3	+.3	+.3	+.2	+.1	.0
JUL	-.1	.0	+.1	+.2	+.2	+.3	+.3	+.3	+.3	+.3	+.2	+.2
AUG	-.2	-.2	-.1	.0	+.1	+.1	+.2	+.2	+.3	+.3	+.3	+.3
SEP	-.3	-.3	-.2	-.2	-.1	-.1	.0	+.1	+.2	+.2	+.3	+.3
OCT	-.3	-.3	-.3	-.3	-.3	-.2	-.2	-.1	.0	+.1	+.2	+.2
NOV	-.2	-.3	-.4	-.4	-.4	-.4	-.3	-.3	-.2	-.1	.0	+.1
DEC	-.1	-.2	-.3	-.4	-.4	-.5	-.5	-.4	-.3	-.2	-.1	.0

$$\text{Azimuth of Polaris} = \frac{(b_0 + b_1 + b_2)}{\cos(\text{Latitude})}$$

Table 12c. To determine azimuth from Polaris, 1995

LST	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	6 ^h	7 ^h	8 ^h	9 ^h	10 ^h	11 ^h
	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀
Minutes												
0	+27.6	+17.2	+ 5.5	- 6.5	-18.0	-28.3	-36.6	-42.3	-45.1	-44.8	-41.4	-35.3
3	27.1	16.6	5.0	7.1	18.6	28.7	36.9	42.5	45.1	44.7	41.2	34.9
6	26.6	16.0	4.4	7.7	19.1	29.2	37.2	42.7	45.2	44.6	40.9	34.6
9	26.1	15.5	3.8	8.2	19.7	29.7	37.6	42.9	45.2	44.4	40.7	34.2
12	25.6	14.9	3.2	8.8	20.2	30.1	37.9	43.1	45.2	44.3	40.4	33.8
15	+25.1	+14.3	+ 2.5	- 9.4	-20.7	-30.6	-38.2	-43.3	-45.3	-44.2	-40.1	-33.4
18	24.6	13.8	1.9	10.0	21.3	31.0	38.6	43.4	45.3	44.1	39.9	33.0
21	24.1	13.2	1.3	10.6	21.8	31.4	38.9	43.6	45.3	43.9	39.6	32.6
24	23.6	12.6	0.7	11.2	22.3	31.9	39.2	43.7	45.3	43.8	39.3	32.2
27	23.1	12.0	0.1	11.8	22.8	32.3	39.5	43.9	45.3	43.6	39.0	31.8
30	+22.6	+11.5	- 0.5	-12.3	-23.4	-32.7	-39.8	-44.0	-45.3	-43.5	-38.7	-31.4
33	22.0	10.9	1.1	12.9	23.9	33.1	40.0	44.2	45.3	43.3	38.4	30.9
36	21.5	10.3	1.7	13.5	24.4	33.5	40.3	44.3	45.2	43.1	38.1	30.5
39	21.0	9.7	2.3	14.1	24.9	33.9	40.6	44.4	45.2	42.9	37.7	30.1
42	20.4	9.1	2.9	14.6	25.4	34.3	40.8	44.5	45.2	42.7	37.4	29.6
45	+19.9	+ 8.5	- 3.5	-15.2	-25.9	-34.7	-41.1	-44.6	-45.1	-42.5	-37.1	-29.2
48	19.4	7.9	4.1	15.8	26.4	35.1	41.4	44.7	45.1	42.3	36.7	28.7
51	18.8	7.3	4.7	16.3	26.9	35.5	41.6	44.8	45.0	42.1	36.4	28.3
54	18.3	6.7	5.3	16.9	27.3	35.8	41.8	44.9	44.9	41.9	36.0	27.8
57	17.7	6.1	5.9	17.5	27.8	36.2	42.1	45.0	44.8	41.7	35.7	27.3
60	+17.2	+ 5.5	- 6.5	-18.0	-28.3	-36.6	-42.3	-45.1	-44.8	-41.4	-35.3	-26.9
LATITUDE	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁
Degrees												
0	-.3	-.2	.0	+.2	+.3	+.4	+.3	+.2	.0	-.2	-.3	-.4
10	-.3	-.1	.0	+.2	+.3	+.3	+.3	+.1	.0	-.2	-.3	-.3
20	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
30	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
40	-.1	-.1	.0	+.1	+.1	+.1	+.1	+.1	.0	-.1	-.1	-.1
45	.0	.0	.0	.0	+.1	+.1	.0	.0	.0	.0	-.1	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+.1	.0	.0	.0	-.1	-.1	-.1	.0	.0	.0	+.1	+.1
60	+.1	+.1	.0	-.1	-.1	-.2	-.1	-.1	.0	+.1	+.1	+.2
62	+.2	+.1	.0	-.1	-.2	-.2	-.2	-.1	.0	+.1	+.2	+.2
64	+.2	+.1	.0	-.1	-.2	-.3	-.2	-.1	.0	+.1	+.2	+.3
66	+.3	+.2	.0	-.2	-.3	-.3	-.3	-.2	.0	+.2	+.3	+.3
MONTH	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂
JAN	-.1	-.1	.0	.0	.0	+.1	+.1	+.1	+.1	+.1	+.1	+.1
FEB	-.2	-.2	-.2	-.1	-.1	.0	.0	+.1	+.2	+.2	+.2	+.2
MAR	-.3	-.3	-.3	-.3	-.2	-.2	-.1	.0	+.1	+.1	+.2	+.3
APR	-.3	-.3	-.4	-.4	-.4	-.3	-.2	-.2	-.1	.0	+.1	+.2
MAY	-.2	-.3	-.3	-.4	-.4	-.4	-.4	-.3	-.2	-.1	.0	+.1
JUN	.0	-.1	-.2	-.3	-.4	-.4	-.4	-.4	-.3	-.3	-.2	-.1
JUL	+.1	.0	-.1	-.2	-.3	-.3	-.4	-.4	-.4	-.3	-.3	-.2
AUG	+.2	+.2	+.1	.0	-.1	-.2	-.3	-.3	-.3	-.4	-.3	-.3
SEP	+.3	+.3	+.2	+.2	+.1	.0	-.1	-.2	-.2	-.3	-.3	-.3
OCT	+.3	+.3	+.3	+.3	+.3	+.2	+.1	.0	-.1	-.2	-.2	-.3
NOV	+.3	+.3	+.4	+.4	+.4	+.3	+.3	+.2	+.1	.0	-.1	-.2
DEC	+.1	+.2	+.3	+.4	+.4	+.4	+.4	+.3	+.3	+.2	+.1	.0

$$\text{Azimuth of Polaris} = \frac{(b_0 + b_1 + b_2)}{\cos(\text{Latitude})}$$

Table 12c. To determine azimuth from Polaris, 1995 - continued

LST	12 ^h	13 ^h	14 ^h	15 ^h	16 ^h	17 ^h	18 ^h	19 ^h	20 ^h	21 ^h	22 ^h	23 ^h
	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀
Minutes												
0	-26.9	-16.7	- 5.4	+ 6.3	+17.5	+27.6	+35.9	+41.8	+44.9	+44.9	+41.9	+36.0
3	26.4	16.1	4.8	6.8	18.0	28.1	36.2	42.0	45.0	44.9	41.7	35.6
6	25.9	15.6	4.2	7.4	18.6	28.5	36.6	42.2	45.0	44.8	41.5	35.3
9	25.4	15.0	3.6	8.0	19.1	29.0	36.9	42.4	45.1	44.7	41.2	34.9
12	25.0	14.5	3.1	8.6	19.6	29.4	37.3	42.6	45.1	44.6	41.0	34.5
15	-24.5	-13.9	- 2.5	+ 9.1	+20.2	+29.9	+37.6	+42.8	+45.2	+44.5	+40.7	+34.1
18	24.0	13.4	1.9	9.7	20.7	30.3	37.9	43.0	45.2	44.4	40.4	33.7
21	23.5	12.8	1.3	10.3	21.2	30.7	38.2	43.2	45.3	44.2	40.2	33.3
24	23.0	12.2	0.7	10.8	21.7	31.2	38.5	43.4	45.3	44.1	39.9	32.9
27	22.5	11.7	0.1	11.4	22.2	31.6	38.9	43.5	45.3	44.0	39.6	32.5
30	-22.0	-11.1	+ 0.4	+12.0	+22.7	+32.0	+39.2	+43.7	+45.3	+43.8	+39.3	+32.1
33	21.4	10.5	1.0	12.5	23.2	32.4	39.4	43.9	45.3	43.7	39.0	31.6
36	20.9	10.0	1.6	13.1	23.7	32.8	39.7	44.0	45.3	43.5	38.7	31.2
39	20.4	9.4	2.2	13.7	24.2	33.2	40.0	44.1	45.3	43.3	38.4	30.8
42	19.9	8.8	2.8	14.2	24.7	33.6	40.3	44.3	45.3	43.2	38.1	30.3
45	-19.4	- 8.3	+ 3.4	+14.8	+25.2	+34.0	+40.5	+44.4	+45.2	+43.0	+37.7	+29.9
48	18.8	7.7	3.9	15.3	25.7	34.4	40.8	44.5	45.2	42.8	37.4	29.4
51	18.3	7.1	4.5	15.9	26.2	34.8	41.1	44.6	45.1	42.6	37.1	29.0
54	17.8	6.5	5.1	16.4	26.7	35.1	41.3	44.7	45.1	42.4	36.7	28.5
57	17.2	6.0	5.7	17.0	27.1	35.5	41.5	44.8	45.0	42.2	36.4	28.0
60	-16.7	- 5.4	+ 6.3	+17.5	+27.6	+35.9	+41.8	+44.9	+44.9	+41.9	+36.0	+27.6
LATITUDE	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁
Degrees												
0	-.3	-.2	.0	+.2	+.3	+.4	+.3	+.2	.0	-.2	-.3	-.4
10	-.3	-.1	.0	+.2	+.3	+.3	+.3	+.1	.0	-.2	-.3	-.3
20	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
30	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
40	-.1	-.1	.0	+.1	+.1	+.1	+.1	+.1	.0	-.1	-.1	-.1
45	.0	.0	.0	.0	+.1	+.1	.0	.0	.0	.0	-.1	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+.1	.0	.0	.0	-.1	-.1	-.1	.0	.0	.0	+.1	+.1
60	+.1	+.1	.0	-.1	-.1	-.2	-.1	-.1	.0	+.1	+.1	+.2
62	+.2	+.1	.0	-.1	-.2	-.2	-.2	-.1	.0	+.1	+.2	+.2
64	+.2	+.1	.0	-.1	-.2	-.3	-.2	-.1	.0	+.1	+.2	+.3
66	+.3	+.2	.0	-.2	-.3	-.3	-.3	-.2	.0	+.2	+.3	+.3
MONTH	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂
JAN	+.1	+.1	.0	.0	.0	-.1	-.1	-.1	-.1	-.1	-.1	-.1
FEB	+.2	+.2	+.2	+.1	+.1	.0	.0	-.1	-.2	-.2	-.2	-.2
MAR	+.3	+.3	+.3	+.3	+.2	+.2	+.1	.0	-.1	-.1	-.2	-.3
APR	+.3	+.3	+.4	+.4	+.4	+.3	+.2	+.2	+.1	.0	-.1	-.2
MAY	+.2	+.3	+.3	+.4	+.4	+.4	+.4	+.3	+.2	+.1	.0	-.1
JUN	.0	+.1	+.2	+.3	+.4	+.4	+.4	+.4	+.3	+.3	+.2	+.1
JUL	-.1	.0	+.1	+.2	+.3	+.3	+.4	+.4	+.4	+.3	+.3	+.2
AUG	-.2	-.2	-.1	.0	+.1	+.2	+.3	+.3	+.3	+.4	+.3	+.3
SEP	-.3	-.3	-.2	-.2	-.1	.0	+.1	+.2	+.2	+.3	+.3	+.3
OCT	-.3	-.3	-.3	-.3	-.3	-.2	-.1	.0	+.1	+.2	+.2	+.3
NOV	-.3	-.3	-.4	-.4	-.4	-.3	-.3	-.2	-.1	.0	+.1	+.2
DEC	-.1	-.2	-.3	-.4	-.4	-.4	-.4	-.3	-.3	-.2	-.1	.0

$$\text{Azimuth of Polaris} = \frac{(b_0 + b_1 + b_2)}{\cos(\text{Latitude})}$$

Table 12d. To determine azimuth from Polaris, 1996

LST	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	6 ^h	7 ^h	8 ^h	9 ^h	10 ^h	11 ^h
	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀
Minutes												
0	+27.6	+17.3	+ 5.7	- 6.2	-17.7	-28.0	-36.3	-42.0	-44.8	-44.6	-41.3	-35.3
3	27.1	16.7	5.1	6.8	18.3	28.5	36.6	42.2	44.9	44.5	41.1	34.9
6	26.6	16.2	4.5	7.4	18.8	28.9	37.0	42.4	44.9	44.4	40.8	34.5
9	26.2	15.6	3.9	8.0	19.4	29.4	37.3	42.6	45.0	44.3	40.6	34.2
12	25.7	15.0	3.3	8.6	19.9	29.8	37.6	42.8	45.0	44.2	40.3	33.8
15	+25.2	+14.5	+ 2.7	- 9.2	-20.5	-30.3	-38.0	-43.0	-45.1	-44.0	-40.1	-33.4
18	24.7	13.9	2.1	9.8	21.0	30.7	38.3	43.2	45.1	43.9	39.8	33.0
21	24.2	13.3	1.5	10.4	21.5	31.1	38.6	43.3	45.1	43.8	39.5	32.6
24	23.7	12.8	0.9	10.9	22.0	31.6	38.9	43.5	45.1	43.6	39.2	32.2
27	23.2	12.2	0.3	11.5	22.6	32.0	39.2	43.7	45.1	43.5	38.9	31.8
30	+22.6	+11.6	- 0.3	-12.1	-23.1	-32.4	-39.5	-43.8	-45.1	-43.3	-38.6	-31.4
33	22.1	11.0	0.9	12.7	23.6	32.8	39.8	43.9	45.1	43.2	38.3	30.9
36	21.6	10.4	1.5	13.2	24.1	33.2	40.0	44.1	45.1	43.0	38.0	30.5
39	21.1	9.9	2.1	13.8	24.6	33.6	40.3	44.2	45.0	42.8	37.7	30.1
42	20.5	9.3	2.6	14.4	25.1	34.0	40.6	44.3	45.0	42.6	37.4	29.6
45	+20.0	+ 8.7	- 3.2	-14.9	-25.6	-34.4	-40.8	-44.4	-44.9	-42.4	-37.0	-29.2
48	19.5	8.1	3.8	15.5	26.1	34.8	41.1	44.5	44.9	42.2	36.7	28.8
51	18.9	7.5	4.4	16.1	26.6	35.2	41.3	44.6	44.8	42.0	36.4	28.3
54	18.4	6.9	5.0	16.6	27.0	35.5	41.6	44.7	44.7	41.8	36.0	27.8
57	17.8	6.3	5.6	17.2	27.5	35.9	41.8	44.8	44.7	41.6	35.6	27.4
60	+17.3	+ 5.7	- 6.2	-17.7	-28.0	-36.3	-42.0	-44.8	-44.6	-41.3	-35.3	-26.9
LATITUDE	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁
Degrees												
0	-.3	-.2	.0	+.2	+.3	+.4	+.3	+.2	.0	-.2	-.3	-.4
10	-.3	-.1	.0	+.2	+.3	+.3	+.3	+.1	.0	-.2	-.3	-.3
20	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
30	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
40	-.1	-.1	.0	+.1	+.1	+.1	+.1	+.1	.0	-.1	-.1	-.1
45	.0	.0	.0	.0	.0	+.1	.0	.0	.0	.0	.0	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+.1	.0	.0	.0	-.1	-.1	-.1	.0	.0	.0	+.1	+.1
60	+.1	+.1	.0	-.1	-.1	-.2	-.1	-.1	.0	+.1	+.1	+.2
62	+.2	+.1	.0	-.1	-.2	-.2	-.2	-.1	.0	+.1	+.2	+.2
64	+.2	+.1	.0	-.1	-.2	-.3	-.2	-.1	.0	+.1	+.2	+.3
66	+.3	+.2	.0	-.2	-.3	-.3	-.3	-.2	.0	+.2	+.3	+.3
MONTH	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂
JAN	-.1	-.1	.0	.0	+.1	+.1	+.1	+.2	+.2	+.2	+.2	+.1
FEB	-.2	-.2	-.2	-.1	-.1	.0	+.1	+.1	+.2	+.2	+.2	+.2
MAR	-.3	-.3	-.3	-.3	-.2	-.1	-.1	.0	+.1	+.2	+.2	+.3
APR	-.3	-.3	-.4	-.4	-.3	-.3	-.2	-.1	.0	.0	+.1	+.2
MAY	-.2	-.3	-.3	-.4	-.4	-.4	-.3	-.3	-.2	-.1	.0	+.1
JUN	.0	-.1	-.2	-.3	-.4	-.4	-.4	-.4	-.3	-.2	-.2	-.1
JUL	+.1	.0	-.1	-.2	-.2	-.3	-.3	-.4	-.4	-.3	-.3	-.2
AUG	+.2	+.2	+.1	.0	-.1	-.2	-.2	-.3	-.3	-.3	-.3	-.3
SEP	+.3	+.3	+.2	+.2	+.1	.0	-.1	-.1	-.2	-.3	-.3	-.3
OCT	+.3	+.3	+.3	+.3	+.3	+.2	+.1	.0	.0	-.1	-.2	-.3
NOV	+.3	+.3	+.4	+.4	+.4	+.4	+.3	+.2	+.1	.0	-.1	-.2
DEC	+.1	+.2	+.3	+.4	+.4	+.4	+.4	+.4	+.3	+.2	+.1	.0

$$\text{Azimuth of Polaris} = \frac{(b_0 + b_1 + b_2)}{\cos(\text{Latitude})}$$

Table 12d. To determine azimuth from Polaris, 1996 - continued

LST	12 ^h	13 ^h	14 ^h	15 ^h	16 ^h	17 ^h	18 ^h	19 ^h	20 ^h	21 ^h	22 ^h	23 ^h
	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀
Minutes												
0	-26.9	-16.8	- 5.6	+ 6.0	+17.2	+27.3	+35.6	+41.5	+44.7	+44.8	+41.8	+36.0
3	26.4	16.2	5.0	6.6	17.8	27.8	35.9	41.7	44.7	44.7	41.6	35.6
6	26.0	15.7	4.4	7.2	18.3	28.2	36.3	42.0	44.8	44.6	41.4	35.2
9	25.5	15.2	3.8	7.8	18.8	28.7	36.6	42.2	44.9	44.5	41.1	34.9
12	25.0	14.6	3.2	8.3	19.4	29.1	37.0	42.4	44.9	44.4	40.9	34.5
15	-24.5	-14.0	- 2.7	+ 8.9	+19.9	+29.6	+37.3	+42.6	+45.0	+44.3	+40.6	+34.1
18	24.0	13.5	2.1	9.5	20.4	30.0	37.6	42.8	45.0	44.2	40.4	33.7
21	23.5	12.9	1.5	10.0	20.9	30.4	38.0	42.9	45.1	44.1	40.1	33.3
24	23.0	12.4	0.9	10.6	21.4	30.9	38.3	43.1	45.1	44.0	39.8	32.9
27	22.5	11.8	0.3	11.2	22.0	31.3	38.6	43.3	45.1	43.8	39.5	32.5
30	-22.0	-11.3	+ 0.2	+11.7	+22.5	+31.7	+38.9	+43.5	+45.1	+43.7	+39.2	+32.1
33	21.5	10.7	0.8	12.3	23.0	32.1	39.2	43.6	45.1	43.5	38.9	31.6
36	21.0	10.1	1.4	12.9	23.5	32.5	39.5	43.8	45.1	43.4	38.6	31.2
39	20.5	9.6	2.0	13.4	24.0	32.9	39.7	43.9	45.1	43.2	38.3	30.8
42	20.0	9.0	2.6	14.0	24.4	33.3	40.0	44.0	45.1	43.0	38.0	30.3
45	-19.4	- 8.4	+ 3.1	+14.5	+24.9	+33.7	+40.3	+44.1	+45.0	+42.8	+37.7	+29.9
48	18.9	7.9	3.7	15.1	25.4	34.1	40.5	44.3	45.0	42.7	37.4	29.4
51	18.4	7.3	4.3	15.6	25.9	34.5	40.8	44.4	45.0	42.5	37.0	29.0
54	17.9	6.7	4.9	16.2	26.4	34.9	41.0	44.5	44.9	42.3	36.7	28.5
57	17.3	6.1	5.5	16.7	26.8	35.2	41.3	44.6	44.8	42.0	36.3	28.1
60	-16.8	- 5.6	+ 6.0	+17.2	+27.3	+35.6	+41.5	+44.7	+44.8	+41.8	+36.0	+27.6
LATITUDE	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁
Degrees												
0	-.3	-.2	.0	+.2	+.3	+.4	+.3	+.2	.0	-.2	-.3	-.4
10	-.3	-.1	.0	+.2	+.3	+.3	+.3	+.1	.0	-.2	-.3	-.3
20	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
30	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
40	-.1	-.1	.0	+.1	+.1	+.1	+.1	+.1	.0	-.1	-.1	-.1
45	.0	.0	.0	.0	.0	+.1	.0	.0	.0	.0	.0	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+.1	.0	.0	.0	-.1	-.1	-.1	.0	.0	.0	+.1	+.1
60	+.1	+.1	.0	-.1	-.1	-.2	-.1	-.1	.0	+.1	+.1	+.2
62	+.2	+.1	.0	-.1	-.2	-.2	-.2	-.1	.0	+.1	+.2	+.2
64	+.2	+.1	.0	-.1	-.2	-.3	-.2	-.1	.0	+.1	+.2	+.3
66	+.3	+.2	.0	-.2	-.3	-.3	-.3	-.2	.0	+.2	+.3	+.3
MONTH	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂
JAN	+.1	+.1	.0	.0	-.1	-.1	-.1	-.2	-.2	-.2	-.2	-.1
FEB	+.2	+.2	+.2	+.1	+.1	.0	-.1	-.1	-.2	-.2	-.2	-.2
MAR	+.3	+.3	+.3	+.3	+.2	+.1	+.1	.0	-.1	-.2	-.2	-.3
APR	+.3	+.3	+.4	+.4	+.3	+.3	+.2	+.1	.0	.0	-.1	-.2
MAY	+.2	+.3	+.3	+.4	+.4	+.4	+.3	+.3	+.2	+.1	.0	-.1
JUN	.0	+.1	+.2	+.3	+.4	+.4	+.4	+.4	+.3	+.2	+.2	+.1
JUL	-.1	.0	+.1	+.2	+.2	+.3	+.3	+.4	+.4	+.3	+.3	+.2
AUG	-.2	-.2	-.1	.0	+.1	+.2	+.2	+.3	+.3	+.3	+.3	+.3
SEP	-.3	-.3	-.2	-.2	-.1	.0	+.1	+.1	+.2	+.3	+.3	+.3
OCT	-.3	-.3	-.3	-.3	-.3	-.2	-.1	.0	.0	+.1	+.2	+.3
NOV	-.3	-.3	-.4	-.4	-.4	-.4	-.3	-.2	-.1	.0	+.1	+.2
DEC	-.1	-.2	-.3	-.4	-.4	-.4	-.4	-.4	-.3	-.2	-.1	.0

$$\text{Azimuth of Polaris} = \frac{(b_0 + b_1 + b_2)}{\cos(\text{Latitude})}$$

Table 12e. To determine azimuth from Polaris, 1997

LST	0 ^h	1 ^h	2 ^h	3 ^h	4 ^h	5 ^h	6 ^h	7 ^h	8 ^h	9 ^h	10 ^h	11 ^h
	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀
Minutes												
0	+27.6	+17.4	+ 5.9	- 6.0	-17.5	-27.7	-36.0	-41.8	-44.6	-44.4	-41.2	-35.2
3	27.2	16.8	5.3	6.6	18.0	28.2	36.3	42.0	44.7	44.3	41.0	34.9
6	26.7	16.3	4.7	7.2	18.6	28.6	36.7	42.2	44.7	44.2	40.7	34.5
9	26.2	15.7	4.1	7.8	19.1	29.1	37.0	42.4	44.8	44.1	40.5	34.1
12	25.7	15.2	3.5	8.4	19.7	29.5	37.4	42.6	44.8	44.0	40.2	33.8
15	+25.2	+14.6	+ 2.9	- 9.0	-20.2	-30.0	-37.7	-42.7	-44.9	-43.9	-40.0	-33.4
18	24.7	14.0	2.3	9.5	20.7	30.4	38.0	42.9	44.9	43.8	39.7	33.0
21	24.2	13.5	1.7	10.1	21.2	30.9	38.3	43.1	44.9	43.6	39.4	32.6
24	23.7	12.9	1.1	10.7	21.8	31.3	38.6	43.3	44.9	43.5	39.1	32.2
27	23.2	12.3	0.5	11.3	22.3	31.7	38.9	43.4	44.9	43.3	38.8	31.8
30	+22.7	+11.7	- 0.1	-11.9	-22.8	-32.1	-39.2	-43.6	-44.9	-43.2	-38.6	-31.4
33	22.2	11.2	0.7	12.4	23.3	32.6	39.5	43.7	44.9	43.0	38.2	30.9
36	21.7	10.6	1.3	13.0	23.8	33.0	39.8	43.8	44.9	42.8	37.9	30.5
39	21.1	10.0	1.8	13.6	24.3	33.4	40.1	44.0	44.8	42.7	37.6	30.1
42	20.6	9.4	2.4	14.1	24.8	33.8	40.3	44.1	44.8	42.5	37.3	29.7
45	+20.1	+ 8.8	- 3.0	-14.7	-25.3	-34.1	-40.6	-44.2	-44.8	-42.3	-37.0	-29.2
48	19.5	8.2	3.6	15.3	25.8	34.5	40.8	44.3	44.7	42.1	36.6	28.8
51	19.0	7.7	4.2	15.8	26.3	34.9	41.1	44.4	44.6	41.9	36.3	28.3
54	18.5	7.1	4.8	16.4	26.8	35.3	41.3	44.5	44.6	41.7	36.0	27.9
57	17.9	6.5	5.4	16.9	27.2	35.6	41.5	44.5	44.5	41.4	35.6	27.4
60	+17.4	+ 5.9	- 6.0	-17.5	-27.7	-36.0	-41.8	-44.6	-44.4	-41.2	-35.2	-26.9
LATITUDE	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁
Degrees												
0	-.3	-.2	.0	+.2	+.3	+.3	+.3	+.2	.0	-.2	-.3	-.3
10	-.3	-.1	.0	+.1	+.3	+.3	+.3	+.1	.0	-.1	-.3	-.3
20	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
30	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
40	-.1	-.1	.0	+.1	+.1	+.1	+.1	+.1	.0	-.1	-.1	-.1
45	.0	.0	.0	.0	.0	+.1	.0	.0	.0	.0	.0	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+.1	.0	.0	.0	-.1	-.1	-.1	.0	.0	.0	+.1	+.1
60	+.1	+.1	.0	-.1	-.1	-.2	-.1	-.1	.0	+.1	+.1	+.2
62	+.2	+.1	.0	-.1	-.2	-.2	-.2	-.1	.0	+.1	+.2	+.2
64	+.2	+.1	.0	-.1	-.2	-.3	-.2	-.1	.0	+.1	+.2	+.3
66	+.3	+.2	.0	-.2	-.3	-.3	-.3	-.2	.0	+.2	+.3	+.3
MONTH	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂
JAN	-.1	-.1	.0	.0	+.1	+.1	+.2	+.2	+.2	+.2	+.2	+.1
FEB	-.2	-.2	-.2	-.1	.0	.0	+.1	+.2	+.2	+.2	+.3	+.3
MAR	-.3	-.3	-.3	-.3	-.2	-.1	.0	.0	+.1	+.2	+.3	+.3
APR	-.3	-.3	-.4	-.4	-.3	-.3	-.2	-.1	.0	+.1	+.2	+.2
MAY	-.2	-.3	-.3	-.4	-.4	-.4	-.3	-.2	-.2	-.1	.0	+.1
JUN	-.1	-.2	-.2	-.3	-.3	-.4	-.4	-.3	-.3	-.2	-.1	.0
JUL	+.1	.0	-.1	-.2	-.2	-.3	-.3	-.3	-.3	-.3	-.2	-.2
AUG	+.2	+.2	+.1	.0	-.1	-.1	-.2	-.2	-.3	-.3	-.3	-.3
SEP	+.3	+.3	+.2	+.2	+.1	.0	.0	-.1	-.2	-.2	-.3	-.3
OCT	+.3	+.3	+.3	+.3	+.3	+.2	+.2	+.1	.0	-.1	-.2	-.2
NOV	+.2	+.3	+.4	+.4	+.4	+.4	+.3	+.3	+.2	+.1	.0	-.1
DEC	+.1	+.2	+.3	+.4	+.4	+.4	+.4	+.4	+.3	+.2	+.1	.0

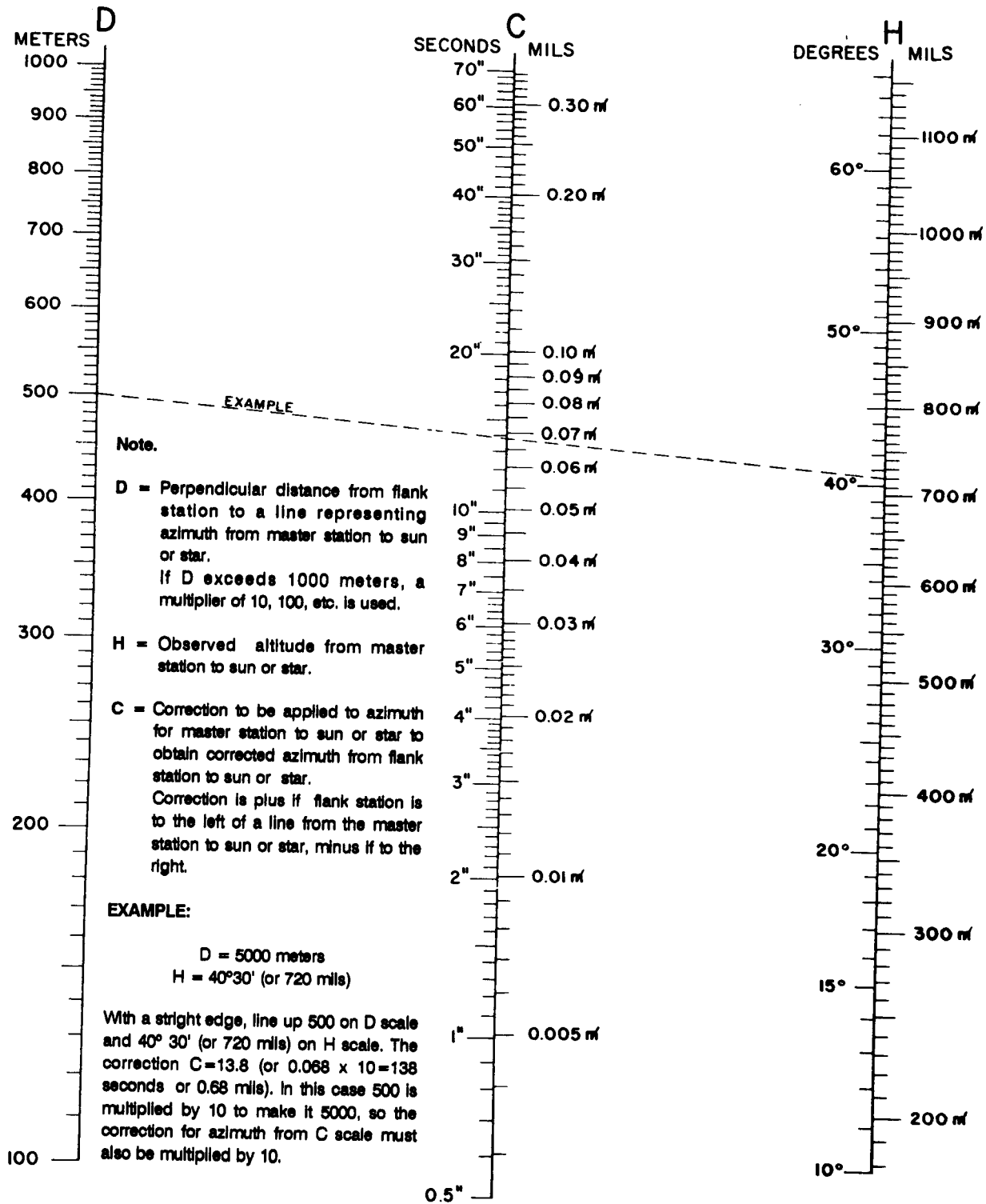
$$\text{Azimuth of Polaris} = \frac{(b_0 + b_1 + b_2)}{\cos(\text{Latitude})}$$

Table 12e. To determine azimuth from Polaris, 1997 - continued

LST	12 ^h	13 ^h	14 ^h	15 ^h	16 ^h	17 ^h	18 ^h	19 ^h	20 ^h	21 ^h	22 ^h	23 ^h
	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀	b ₀
Minutes												
0	-26.9	-16.9	- 5.7	+ 5.8	+17.0	+27.0	+35.3	+41.3	+44.4	+44.6	+41.7	+35.9
3	26.5	16.3	5.1	6.4	17.5	27.5	35.7	41.5	44.5	44.5	41.5	35.6
6	26.0	15.8	4.6	7.0	18.1	28.0	36.0	41.7	44.6	44.4	41.3	35.2
9	25.5	15.3	4.0	7.5	18.6	28.4	36.4	41.9	44.7	44.4	41.0	34.8
12	25.1	14.7	3.4	8.1	19.1	28.9	36.7	42.1	44.7	44.3	40.8	34.4
15	-24.6	-14.2	- 2.8	+ 8.7	+19.6	+29.3	+37.0	+42.3	+44.8	+44.2	+40.5	+34.1
18	24.1	13.6	2.3	9.2	20.2	29.7	37.4	42.5	44.8	44.0	40.3	33.7
21	23.6	13.1	1.7	9.8	20.7	30.2	37.7	42.7	44.8	43.9	40.0	33.3
24	23.1	12.5	1.1	10.4	21.2	30.6	38.0	42.9	44.9	43.8	39.7	32.9
27	22.6	11.9	0.5	10.9	21.7	31.0	38.3	43.0	44.9	43.7	39.4	32.5
30	-22.1	-11.4	+ 0.1	+11.5	+22.2	+31.4	+38.6	+43.2	+44.9	+43.5	+39.2	+32.1
33	21.6	10.8	0.6	12.1	22.7	31.9	38.9	43.4	44.9	43.4	38.9	31.6
36	21.1	10.3	1.2	12.6	23.2	32.3	39.2	43.5	44.9	43.2	38.6	31.2
39	20.6	9.7	1.8	13.2	23.7	32.7	39.5	43.7	44.9	43.1	38.3	30.8
42	20.1	9.1	2.4	13.7	24.2	33.1	39.8	43.8	44.9	42.9	37.9	30.3
45	-19.5	- 8.6	+ 2.9	+14.3	+24.7	+33.4	+40.0	+43.9	+44.8	+42.7	+37.6	+29.9
48	19.0	8.0	3.5	14.8	25.2	33.8	40.3	44.0	44.8	42.5	37.3	29.5
51	18.5	7.4	4.1	15.4	25.6	34.2	40.5	44.1	44.8	42.3	37.0	29.0
54	18.0	6.9	4.7	15.9	26.1	34.6	40.8	44.2	44.7	42.1	36.6	28.6
57	17.4	6.3	5.3	16.5	26.6	35.0	41.0	44.3	44.7	41.9	36.3	28.1
60	-16.9	- 5.7	+ 5.8	+17.0	+27.0	+35.3	+41.3	+44.4	+44.6	+41.7	+35.9	+27.6
LATITUDE	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁	b ₁
Degrees												
0	-.3	-.2	.0	+.2	+.3	+.3	+.3	+.2	.0	-.2	-.3	-.3
10	-.3	-.1	.0	+.1	+.3	+.3	+.3	+.1	.0	-.1	-.3	-.3
20	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
30	-.2	-.1	.0	+.1	+.2	+.2	+.2	+.1	.0	-.1	-.2	-.2
40	-.1	-.1	.0	+.1	+.1	+.1	+.1	+.1	.0	-.1	-.1	-.1
45	.0	.0	.0	.0	.0	+.1	.0	.0	.0	.0	.0	-.1
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	+.1	.0	.0	.0	-.1	-.1	-.1	.0	.0	.0	+.1	+.1
60	+.1	+.1	.0	-.1	-.1	-.2	-.1	-.1	.0	+.1	+.1	+.2
62	+.2	+.1	.0	-.1	-.2	-.2	-.2	-.1	.0	+.1	+.2	+.2
64	+.2	+.1	.0	-.1	-.2	-.3	-.2	-.1	.0	+.1	+.2	+.3
66	+.3	+.2	.0	-.2	-.3	-.3	-.3	-.2	.0	+.2	+.3	+.3
MONTH	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂	b ₂
JAN	+.1	+.1	.0	.0	-.1	-.1	-.2	-.2	-.2	-.2	-.2	-.1
FEB	+.2	+.2	+.2	+.1	.0	.0	-.1	-.2	-.2	-.2	-.3	-.3
MAR	+.3	+.3	+.3	+.3	+.2	+.1	.0	.0	-.1	-.2	-.3	-.3
APR	+.3	+.3	+.4	+.4	+.3	+.3	+.2	+.1	.0	-.1	-.2	-.2
MAY	+.2	+.3	+.3	+.4	+.4	+.4	+.3	+.2	+.2	+.1	.0	-.1
JUN	+.1	+.2	+.2	+.3	+.3	+.4	+.4	+.3	+.3	+.2	+.1	.0
JUL	-.1	.0	+.1	+.2	+.2	+.3	+.3	+.3	+.3	+.3	+.2	+.2
AUG	-.2	-.2	-.1	.0	+.1	+.1	+.2	+.2	+.3	+.3	+.3	+.3
SEP	-.3	-.3	-.2	-.2	-.1	.0	.0	+.1	+.2	+.2	+.3	+.3
OCT	-.3	-.3	-.3	-.3	-.3	-.2	-.2	-.1	.0	+.1	+.2	+.2
NOV	-.2	-.3	-.4	-.4	-.4	-.4	-.3	-.3	-.2	-.1	.0	+.1
DEC	-.1	-.2	-.3	-.4	-.4	-.4	-.4	-.4	-.3	-.2	-.1	.0

$$\text{Azimuth of Polaris} = (b_0 + b_1 + b_2) \\ \cos (\text{Latitude})$$

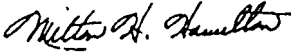
Table 13. Grid azimuth correction, simultaneous observation



By Order of the Secretary of the Army:

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